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An Address

ON THE

SPECIFIC CHARACTER OF MALIGNANT NEOPLASIA,

WITH SPECIAL REFERENCE TO THE CONTROL OF CANCER FROM THIS STANDPOINT.

Delivered before the Academy of Medicine, Toronto, on Nov. 10th, 1925,

BY W. BLAIR BELL, B.S., M.D. LOND.,

PROFESSOR OF GYNÆCOLOGY AND OBSTETRICS IN THE UNIVERSITY OF LIVERPOOL; GYNÆCOLOGICAL AND OBSTETRICAL SURGEON, ROYAL INFIRMARY, LIVERPOOL; HON. DIRECTOR, LIVERPOOL CANCER RESEARCH; HON. FELLOW, AMERICAN COLLEGE OF SURGEONS; HON. FELLOW, AMERICAN GYNÆCOLOGICAL SOCIETY; HON. PRESIDENT, GLASGOW OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

IN the whole range of medical science there is nothing of greater interest and importance than the control of malignant disease. Even so, and in spite of the fact that I have expended much thought and energy for 17 years in attacking this question, I find it necessary to summon all my courage to deal in words with a problem so difficult, so engrossing, so momentous, and, I may add, once so contentious. Those of us who enter the arena in the fight against cancer must do so unfettered, having purified our minds of all preconceptions and prejudices. At the same time we must avoid attaching undue significance to every little detail that comes to light as the result of our own work or of that of others; the winnowing of the chaff from the grain must be relentless and thorough.

Now, in regard to the problem of malignant disease, unfortunately there has been a tendency to consider each fresh and important observation as "the solution of the central problem," instead of merely as a step in that direction. For instance, supposing that an absolutely specific causal factor, effective at will, were to be demonstrated, it by no means follows that the cancer problem would be settled. I need not refer to the numerous instances in medicine of such failures; they are well known, and it is interesting to reflect that in many of them the position, unlike that of cancer, has been, or has appeared to be, comparatively simple.

THE CANCER PROBLEM STATED.

The problem of cancer can only be the complete understanding and control of that divergence from the normal, both from preventive and curative points of view. This, indeed, is the "central problem," whether scientifically or practically considered; this, and not every fresh quest after the so-called cause or causes of cancer.

The solution of every large problem—as of those of Euclid—is dependent on the correct application, step by step, of a number of related demonstrata that lead to the final proof. We have long been in possession of a sufficient number of isolated facts from which to elucidate the final solution, if only they had been properly sorted and placed in their true perspective—that is, if we had known how they should look when placed. This is the history of every scientific achievement. The whole question of malignant neoplasia is so complex, and the appreciation of the possible mechanisms concerned requires such a wide range of knowledge, that it is not difficult to understand how it comes about that most investigators have been content to stumble along after one issue, whereas Pasteur, if he had attacked the problem, would have tried to visualise first the complete picture; he would have formed a substantial working hypothesis.

If clear thinking were ever needed it is surely essential to the solution of this problem; yet, as the result of the limitations mentioned, the most important aspect—namely, the *specific process*, as I call it—has been neglected in the hunt for a specific cause, or for specific causal factors acting in conjunction. Still, it is the result rather than the cause, as I hope to show, that is important, for undoubtedly malignant neoplasia is a specific process, but that is not to say that because a process is specific the cause must also be. Those who ascribe specific processes to specific factors are on hazardous ground, for there is plenty of evidence that specific processes of a similar character to that we are discussing—such as the development of an ovum—may be induced by many inciting factors. Indeed, it might as well be argued that because warmth may be a condition necessary for such a change it is the specific agent, whereas it may simply be a condition of environment.

Those of us who are sceptical in regard to the idea that a single specific causal agent, or a combination of two specific causal agents or factors, is inevitably responsible for malignant neoplasia, are fortified by much positive evidence that such factors are numerous. Nevertheless, we are always ready to accept, as we have done in the past, evidence of a newly discovered agent, which is capable of establishing one or more of the conditions necessary for the development of malignant disease.

If it be granted, as it is by a majority of investigators, that the inciting factors of malignant growth are many, it is reasonable to avoid, as we ourselves have done, that aspect of the subject, leaving to others the compilation of an encyclopædia of causes, and possibly the discovery of a factor common to all, in order to concentrate our energies on the consideration of the *nature of cancer*, which appears to be a specific process in itself, and of far more importance than the character of the exciting stimuli.

THE NATURE OF CANCER.

To the biologist growth is a process which is fundamentally similar, whatever its direction, character, or result may be. Theoretically, growth should be continuous and immortal. Practically, it may be persistent or discontinuous, and it is inevitably mortal, in the ordinary sense of the word. Malignant neoplasia differs not at all from differentiated growth in these respects. It is impossible, therefore, to regard neoplasia of a malignant character without taking into account innocent neoplasia and normal growth.

Normal somatic and differentiated growth of the individual is due to intrinsic stimuli acting under the influence of many conditions of environment, both relative—that is, relative so far as one cell influences another which may be adjacent: for example, the formation of the ectodermic structures of the teeth and eyes in relation to the underlying mesoderm—and general, in that the whole metabolism of the body is correlated and adjusted by adaptation to the surroundings, and is perpetuated by heredity.

The development of an innocent neoplasm is similarly situated; and it is impossible to separate a benign growth from simple hyperplasia which arises in normal, healthy cells as the result of increased normal intrinsic stimuli or adventitious, extrinsic stimulation acting on *healthy* cells—that is, cells that are in function fundamentally normal.

In malignant neoplasia the same factors are at work, but the condition of the cells on which they act is different, and the difference appears, from the evidence at our disposal, to be that the cells in which the abnormal development occurs are *not healthy*.

If we consider for a moment the statements I have just made it becomes obvious that they are too general in regard to malignant neoplasia. The view that innocent neoplasia arises from healthy cells is clear enough; but simply to say that the cells from which malignant neoplasms originate are unhealthy is too vague without amplification. By unhealthiness of a cell I mean, then, that for some reason it is not functioning normally. Now, the functions of a cell are twofold: in the first place it has functions in respect of its own individual metabolism; and, secondly, it possesses properties and activities in relation to the body as a whole, of which it is a unit.

What, then, happens to and in a cell driving it to adopt an unnatural, malignant, course of life? A healthy cell does not do this, a dead cell cannot. There is, however, an intermediate state. The cell functions are impaired. Whatever causal factor, whether metabolic or extrinsic, can permanently impair the cell, without killing it, may be regarded as a predisposing cause or "exciting factor" of malignant developments. When a cell is damaged by X rays it either recovers, develops abnormally, or dies. When it develops abnormally we may regard it as a process which implies a struggle for existence.

To understand the nature of this process—the struggle to survive—we must go back to the beginnings of growth in the individual, study them, coördinate our observations with the known facts of normality and abnormality, and find if there is anywhere a clue to the divergence from the normal that may be regarded as, what I may perhaps call, normal malignancy.

It will be remembered that in the mammalian ovum, long before the formation of the embryo begins, the collection of cells, into which the fertilised ovum has developed, receives its nourishment from the saline fluid with which it is surrounded; but that this is soon insufficient for the needs of the mass, undergoing rapid division, a phenomenon not unallied to the struggle for existence. Some further and better supply of food is required, otherwise the ovum will die. In ordinary circumstances the blastocyst attaches itself wherever it may be at the moment necessity urges, and draws its nutriment from the maternal tissues.

In the human subject this process may be fraught with dangers of various kinds, not the least of which is the absence of the inhibitory factor which prevents the invasion of the trophoblastic cells exceeding the normal limit, and developing into an abnormally malignant process.

If I may do so, without wearying you, I will quote a statement already published in special and, therefore, not readily accessible journals, for it expresses briefly and completely our views of the nature of malignant neoplasia:—

"Malignant neoplasia in the human subject, as I see it, is a biological atavism. There is a time in the development of the ovum when somatic cell-correlation and differentiation can hardly be said to exist, except potentially. At that early stage the trophoblast, of which the ovum is largely composed, is engaged in a struggle for existence; unless it can eat its way into the maternal tissues, the whole ovum will perish. The zygote possesses, therefore, the power of developing into cells of two types, the undifferentiated nutritive cells and the differentiated somatic cells.

"Normally, when satisfactory attachment has been obtained, and the maternal blood-vessels have been eroded with dispersion of the circulating blood of the mother among the advancing columns of trophoblastic cells, the area in which the fœtus is to develop grows rapidly, and pari passu the activities of the trophoblast, so far as plastic and invasive properties are concerned, are gradually arrested. Thus it appears that, when the elusive factor in somatic cell-correlation becomes operative and ensures normal and differentiated development in the fœtus, the growth of undifferentiated, 'malignant,' epithelium of the chorion is stayed. It is the nature of this controlling factor that we are endeavouring to determine.

"Should the fœtus die and the supply of somatic 'correlating secretion' cease at a critical time in the period of control, the chorionic epithelium, suddenly relieved of the inhibitory action of this substance, may develop into that most unrestrained and malignant manifestation known as chorion epithelioma.

"The chorion, as I have indicated, has a nutritive function, and to the epithelium is assigned the task of seeking and finding nourishment not only for its own metabolism, but also for the correlated and differentiated somatic cells of the embryo, which in turn send a hormone, we may presume, to restrain chorionic activity once a large enough source of food-supply has been tapped.

"In view of the method of implantation of the ovum in the human subject, and of the origin of chorion epithelioma, it seems reasonable to suppose that cells of somatic tissues, formerly normal, may through senility, injury, infection, and the other inciting and predisposing factors of cancer, slowly lose their power of obtaining or utilising nutriment, and, as the process of starvation is a slow one, adjust themselves to the altered and altering conditions by reverting to an earlier undifferentiated chorionic, nutriment-seeking type.

"It is probable that every cell in the body has this potentiality of atavistic reversion to the nourishment-providing proclivities normally possessed in a special degree by the chorionic epithelium. Once started on the perverted course, there is no reason why the growth of dedifferentiated somatic cells should be arrested, for like those of chorion epithelioma, they are free of differentiated, somatic control."[1]

This is a definite hypothesis founded on the facts of development as they are known to us. It is impossible to go back further in our search for phenomena, associated with growth, that have a bearing on malignant developments.

We have endeavoured to bring fresh light to bear from various aspects of the problem, and we have tried to discover the physiological cause or causes leading to the arrest of the active functions of the chorionic cells, once they have fulfilled their purpose. It seems likely, of course, that the factors governing the differentiation of the somatic tissues of the embryo control the activity of the chorionic epithelium. There is, indeed, much evidence in support of this view, such as the invariable absence of a live embryo in association with chorion epithelioma. Yet a long series of experiments which I conducted, many years ago it is true, failed to confirm or to refute this view. I am inclined to blame the conditions or the conduct of our work for the negative result.

It will not be out of place to emphasise here a few facts of clinical and pathological importance that have a bearing on, and, indeed, lend support to the hypothesis I have endeavoured to develop, before I pass on to a consideration of the experimental and clinical confirmation that we have been able to secure.

It will be remembered that I have referred to the fundamental similarity of all growth processes, pointing out that the earliest ancestral cells—the trophoblastic—are of sheer necessity malignant in character, and that the most malignant type of growth of which we have cognizance is due to the uncontrolled, riotous behaviour of these cells. On the other hand, there are innocent tumours arising in the differentiated tissues of the body, apparently as the result of increased stimulation of normal healthy cells; in other words, hyperplasia occurs.

Then there are certain growths which appear to lie between the innocent and malignant; for example, papillary tumours of the ovary. How can we fit these into our scheme, which might on casual inspection appear to demand such a clear-cut line of demarcation between innocent and malignant neoplasia that the two could not exist in the same tumour? There is, as I have stated, a most essential difference between innocent and malignant neoplasia, apart from the inherent similarity of all growth processes; but this does not exclude the possibility of a malignant development in an innocent neoplasm, as may occur in the hitherto normal, differentiated tissues of the body.

It seems highly probable that, when such a change takes place, the cells of the tumour, previously innocent, have outgrown their blood-supply, or have suffered some other form of metabolic disturbance, with the result that, if necrosis does not occur, they may take on a malignant form of life. This change from innocency to malignancy is most commonly seen in growths of a "cellular type," as we describe them, whether epithelial or mesial in structure.

In passing, it is interesting to note that, just as all primary tumours, innocent and malignant, conform more or less closely to the kind of tissue from which they arise, so the structure of a malignant neoplasm developing in an innocent neoplasm resembles the tissue type of the latter; and it is this conformity that sometimes creates the difficulty of deciding whether a tumour is innocent or malignant.

In this connexion it may be said that the more nearly the structure of a malignant growth approaches that of the somatic tissue in which it is developed,

[1] Bell, W. Blair: Public Health, 1924, xxxvii., 217; Jour. Obstet. and Gynæcol. Brit. Emp., 1925, xxxii., 1.

so much the less virulent is it. Those neoplasms that bear in their texture an appearance resembling that seen in an early phase of the normal development of the tissue in which they arise are most malignant. It is, indeed, axiomatic that the nearer to the trophoblastic phase the character of the neoplastic cell, the nearer will a growth approach in malignancy the intense degree exhibited by the unrestrained chorionic epithelium.

If the statements I have made are correct and the conclusions based upon them are sound, we are justified in regarding the malignant change as a process that is quite specific in character. It is hardly likely that, if the working hypothesis I have enunciated above had been a crude guess, instead of the result of the consideration and correlation of known facts, substantiation of our views would have followed in such generous measure as has been the case. To this I shall now refer.

CONFIRMATION OF THE HYPOTHESIS.

It is always advisable in seeking confirmation of any biological conception to approach the issue from as many directions as possible. This was foreseen when money was provided by a few generous laymen in Liverpool for the purpose of verifying or refuting my views; and as a result a staff of distinguished men, the heads of departments in the University, were invited to coöperate in the prosecution of this important inquiry under my direction. The harmony that has existed and the very intimate interchange of ideas, have, I venture to think, led not only to the output of most valuable original work but have also gone far to place the hypothesis enunciated beyond direct criticism. A considerable amount of work still remains to be completed and developed, provided the means are forthcoming to keep this organisation in being.

The scope of our research work has involved studies in physical chemistry, under the control of Prof. W. C. McC. Lewis; in biochemistry, which is, after all, chiefly physical chemistry, under the joint supervision of Prof. Lewis and Dr. R. Coope; in pharmacology and toxicology, under Dr. W. J. Dilling; in pathology, by Prof. Ernest Glynn; in animal experimentation, by Dr. H. E. Annett; and in the treatment of cancer in the human subject by a group of physicians and surgeons.

In three years about 50 private interim reports have been circulated by members of the staff to their colleagues, and some of these deal with several subjects. So far only four papers have been published, but a number are ready or being prepared for the scientific press. In many instances the lines of inquiry overlap or are dependent one on the other. Much of the work is of a highly technical character, and cannot be suitably described in a few general terms. I am unable, therefore, to do more at this time than touch upon some of the results obtained that supply direct confirmation of our hypothesis.

PHYSICAL AND BIOLOGICAL CHEMISTRY.

In an earlier paper I stated that it appeared probable that lead—a metal to which I shall have to refer at some length directly—has an affinity[2] for the phosphatides and other lipins; and that these substances are probably present in malignant growths in larger quantities than in normal somatic tissues. In a communication of Gye and Cramer,[3] based, it is true, on insufficient material and, therefore, on somewhat inconclusive evidence, the general statement had been made that the more rapidly growing a rat or mouse tumour the greater the phosphatide content. No comparison with normal or other tissues was made by these workers. Their statement was based on the examination of one slowly growing transplantable mouse tumour and one that was rapidly growing, and of one rat sarcoma of rapid growth. It was almost a matter of luck that this conclusion turned out to be correct; but it might easily not have been so, for the variations that occur in similar normal and malignant tissues are considerable, and only by averaging a large number of estimations can a true conclusion be reached. Alone, however, even this finding is not of any great value; it is the relative character of the phosphatide content of tissues that gives such estimations their great importance.

Prof. Lewis and his associates[4] concentrated their efforts in the first place on an experimental examination of the functions of phosphatides and cholesterol in relation to the permeability of the cell membrane. Stated briefly, it was found that whereas a high lecithin content favours an oil-dispersed-in-water variety of emulsion, cholesterol favours a water-dispersed-in-oil type. When, as in cell membranes, these are present together and in the conditions believed to exist—namely, that lecithin and cholesterol are dissolved in different phases, that is, cholesterol in oil and lecithin in water—then a high lecithin-phosphatide ratio would indicate a high degree of permeability of the cell membrane.

This conclusion reached, it became a matter of importance to determine the water, the phosphatide and cholesterol content of normal human tissues, and of innocent and malignant neoplasms *of the same tissues*, and, also, in view of the general hypothesis to make similar analyses of chorionic villi.

This laborious task has been accomplished, some 36 specimens being examined. The very striking results obtained are summarised in the following table:—

Human tissues examined.	Water.	Phosphatides.	Phosphatide-cholesterol ratio.
Normal tissues (ovary, body of uterus, cervix) ..	77·5	2·86	2·8
Innocent neoplasms (ovary, uterus) ..	80·8	2·94	3·4
Malignant neoplasms (ovary, body of uterus, cervix) ..	81·6	4·4	3·6
Chorionic villi ..	89·9	6·84	4·7

In regard to these figures it should be stated that in a general way it is impossible to separate cancerous cells in malignant neoplasms from the supporting and surrounding normal tissues. If cancerous cells are mixed with normal tissues in the proportion of, say, 50 to 50—a figure that would undoubtedly favour the normal tissues—the values for malignant tumours would approach more nearly those for chorionic villi, which also contain a core of connective tissue that may have reduced the value of the figures standing to their credit. In short, chorionic epithelium and malignant cells in all probability have values in regard to the phosphatide content and phosphatide-cholesterol ratio not less than three times that of normal tissues and innocent neoplasms, and also a much higher water content.

Now, as we have seen, permeability of the cell membrane is associated with a high phosphatide value and a high phosphatide-cholesterol ratio. Further, a high water content is actual evidence of permeability, and permeability is favourable to rapid growth. These are the essential features of malignant neoplasia, and they are most noticeable in connexion with chorionic villi, which in the early stages of development are entirely, or chiefly, composed of chorionic epithelium.

[2] "Although I have suggested that the rôle played by lead in the phenomenon of arrested growth depends on a direct chemical reaction between lead-ion and phosphatides, we must not overlook the possibility that lead may act in other ways; for example, by the inhibition of enzyme action in relation to growth. The distinction between these effects, however, may not be so great as appears at first sight, since such a function of lecithin as, for instance, that of an oxygen carrier, might indirectly affect enzyme action."—THE LANCET, 1924, i., 267.

[3] Bullock (Gye), W. E., and Cramer, W.: Proc. Roy. Soc., B, Lond., 1913, lxxxvii., 239.

[4] Corran, J. W., and Lewis, W. C. McC.: Biochem. Jour., 1924 xviii., 1364.

Here, then, is unassailable confirmatory evidence of the views already expounded.

INHIBITION OF NORMAL GROWTH.

We have conducted investigations on several lines to test the effect of various substances on cell growth.

Vegetable Growth.—J. Patterson and the present writer[5] have observed in the case of hyacinths that, if the bulbs be immersed in solutions of lead, a graded effect in the growth of the roots can be obtained, according to the strength of the solution; and with solutions so strong as 1·0 per cent. the subsequent growth of the plant is almost entirely inhibited. It is, too, of remarkable interest that, if the bulbs used for experiment be dried and kept in the ordinary way until the following year, and then be placed in ordinary tap-water, they repeat exactly the phenomenon of arrested growth seen the previous year when they developed in lead-poisoned water.

A chemical examination of dried bulbs that have developed in lead solutions reveals the presence of lead. It is obvious, therefore, that the lead has become bound up with or has affected some body of importance to the normal growth process, whether of the cell membrane or the cell itself, and that even a year later limited growth alone is possible. It has been stated by various observers that seeds are rich in phosphatides, and there is little doubt that the same high proportion should obtain in bulbs, but we ourselves have not made estimations.

This work was carried a stage further by the investigation of the effects of other metals on the development of hyacinths. The ions of copper, zinc, and calcium were tested, and were found to produce certain effects on growth; but these were not really comparable with the effects of lead. Zinc and calcium appeared to be very toxic in the stronger solutions—that is, solutions containing from 0·001 to 1·0 per cent. of the metallic salt. Root growth was practically absent, and in only one case did flowering occur. In weaker solutions the root growth and flowering were unaffected. The same results were obtained with calcium salts. Copper, however, was extremely toxic, and in strengths of copper as low as 0·000 001 per cent., growth of the plant was entirely prevented. It appears likely, therefore, that zinc and copper are directly poisonous, and have no true graded effect in various solutions; they appear either to kill or not to interfere with growth at all. Calcium probably acts by reducing permeability of the cell membranes.

Dr. W. J. Dilling has conducted experiments of a similar character in regard to the germination of seeds (mustard and cress) and obtained somewhat similar results.

Animal Growth.—Dr. Dilling and his fellow-workers have conducted an important series of investigations on the development of frogs' eggs, on the subsequent growth of the tadpole, and on the growth of fish, when placed in water containing the salts of certain metals. He summarises the experiments on frogs' spawn and tadpoles as follows:—

1. *Beryllium.*—Non-toxic.
2. *Zinc.*—Does not arrest the development of frog spawn, but is either lethal to or delays the growth of tadpoles.
3. *Thallium.*—Does not arrest development, but is fatal to tadpoles.
4. *Copper.*—Does not arrest development, but further growth is checked at or about birth. Slows subsequent growth of the tadpole or is fatal to it.
5. *Thorium.*—Development arrest, but to a less degree than lead. No arrest of growth of the tadpole.
6. *Lead.*—In solutions of N/10,000 and stronger, lead completely arrests the development of eggs and checks the growth of the tadpole.

In connexion with the action of lead it may be stated, therefore, that in its effect it is much more definite and comprehensive in its selective specific effect on all growth than is the case with any other metal; indeed, it is the only metal that arrests development of the ovum, and stunts growth subsequently.

[5] Bell, W. Blair: THE LANCET, 1924, i., 267.

In connexion with the action of lead on the tadpole, I cannot refrain from quoting an interesting statement from a report of Dr. Dilling:—

"The second point of interest noted was that arrest of development almost invariably resulted when the egg was at the reniform stage, which corresponds with the late gastrula stage of the embryo, and it was also observed that, if the embryo passed this stage, it generally progressed to hatching, even if it then succumbed. At the late gastrula stage, when these embryos died, the hypoblast is being formed at the expense of the yolk cells which later form a heaped-up mass on the ventral wall of the archenteron to be finally absorbed a day or two after hatching, by which time the mouth has opened. In view of the suggestion of Blair Bell (THE LANCET, 1924, i., 267) that lead arrests growth by a chemical reaction between the lead ion and such a phosphatide as lecithin, the fact that the yolk cells are rich in lecithin must be borne in mind. It may be that lead by combining with the lecithin in the yolk cells arrests by its toxicity further development of the hypoblast, and that this leads to death of the embryo. Presumably, on this theory the embryo would be most vulnerable if the lead reached it before the yolk cells were finally covered by epiblast, that is, just before the stage at which the embryo becomes ovoid or reniform. If, however, the lead does not reach the embryo until the yolk cells and yolk-containing hypoblastic cells are completely protected by the epidermal layer of epiblast, it is reasonable to expect, if Blair Bell's theory that the lecithin is the medium through which lead arrests growth, that the embryo would probably survive and develop to the tadpole stage, and this is, in fact, what has been observed. Then at the tadpole stage, when it comes into direct contact with the poisonous solution, it may succumb by absorption of lead through the external gills or mouth. At present, these must remain as suggestions to account for the observed facts; further work may confirm or disprove them."

The observations on the growth of plaice in lead-poisoned water gave similar results; the growth and vitality of the young fish were reduced, and the effect persisted after removal of the plaice to a normal medium. Finally, it is well known that children poisoned with lead are stunted in their growth.

We have, then, a large series of observations on normal growth, all pointing to the important—I think specific—action of lead on the growth processes.

EFFECT OF LEAD AND OTHER METALS ON THE CHORION EPITHELIUM.

Dr. Hendry, Dr. Annett, and the present writer have published a paper[6] on this subject, giving the results of our experimental inquiry. It has, of course, long been known that in lead-workers abortion is extremely common. The cause for this has been attributed to hæmorrhages in the uterus. I suspected and found many years ago that the action of lead was due to a specific effect on the chorion epithelium, but owing to the war the work was stopped, and my results were not published.

In our recent experimental investigations we demonstrated that, in rabbits, lead alone of all the metals tested—namely, lead, thorium, thallium, and copper—has a specific action on the chorionic epithelium: coagulation necrosis is produced in the cells, and, as a result, abortion takes place. If abortion occur after the other metals it is due to hæmorrhages in the uterus.

If we recall for a moment the table concerning the water and phosphatide content of normal malignant and chorionic tissues we will realise the importance of the investigation I have just mentioned and its bearing on our hypothesis and the problem resulting from it.

ACTION OF LEAD ON MALIGNANT GROWTHS.

We have now reached the final issue. If my hypothesis concerning the fundamental similarity of all growth processes in animals is correct, and if we find a substance that will arrest or be lethal to all, and also shows an increasing degree of toxicity towards growing tissues in direct proportion to their rapidity of growth and malignancy—that is, to the water, phosphatide content, and phosphatide-cholesterol

[6] Bell, W. Blair, Hendry, R. A., and Annett, H. E.: Jour. Obstet. and Gynæcol. Brit. Emp., 1925, xxxii., 1.

ratio—then surely we have arrived almost at the end of our endeavour.

Will our work stand the final test: Does lead arrest malignant disease in man? Here, indeed, is the crux of the central problem. I can assure you that in this respect also we have the fullest confirmation of all I have said. By "fullest" I do not mean that we can cure every case of malignant disease. We cannot; that, unfortunately, will never be possible, as all those who deal with the disease must know. In the cure we may sometimes kill. I have in mind two cases, the first that of a young man with diffuse sarcoma of the stomach, as proved by laparotomy and histological section. The treatment by intravenous injections of lead caused total liquefaction of the stomach, and he died with acute peritoneal symptoms. At the post-mortem examination Prof. Glynn could find no stomach, simply a mush of dead tissue. The second case was that of a woman with a large, rapidly-growing post-cricoid carcinoma. After treatment the entire growth became œdematous and she was suffocated. At the post-mortem examination it was found that the entire tumour had undergone acute necrosis.

Some would say, What further evidence than that is required? If it is, we have it in the fifty or so patients who are believed well, out of about 200, mostly hopeless, cases treated. We have not selected our patients in any way. We have treated practically all who have been sent to us. Many have died within a few weeks of their arrival, before treatment had been hardly more than just begun.

I know you will want to hear very much about our successes. In the next month or so these will be published in THE LANCET. However, I may perhaps risk wearying you and mention two, for we have been fortunate enough to make for them yesterday and to-day days of thanksgiving.

On Nov. 9th, 1920—five years ago yesterday—a woman was admitted to my maternity ward at the Royal Infirmary, Liverpool, for her confinement, which took place a few days later. She was suffering with an extensive, ulcerated carcinoma of the left breast with glands in the axilla. Operation had been considered useless six months previously by two of my surgical colleagues. The growth had been accelerated during pregnancy, as is usual in these circumstances.

I was looking for just such a hopeless case. A section was prepared from a piece of tissue adjacent to the ulcerated area, and intravenous injections of lead were given. Not only is the patient well to-day, five years and one day later, but also she has had two more babies in the interval, both of whom she has suckled at the breast that was affected.

For sentimental reasons of a different character I may tell you about another patient who is now 38 years of age.

This lady was sent to me over a year ago. She had submitted to an exploratory operation at the hands of another surgeon. He found the abdomen full of malignant growth, which he correctly diagnosed as sarcoma, and promptly closed his incision. When she came to Liverpool, thin and ill, I reopened the abdomen to obtain a piece of growth for section, for this had not been done at the former operation. I, too, found the entire abdomen involved. Intestines were mixed up in the growth, and the whole outlook seemed most serious. In ordinary circumstances she had a few weeks to live, for sections showed the growth to be a most rapidly growing spindle-cell sarcoma. Treatment with lead injections has led to a considerable decrease in the size of the tumour, while the patient has herself increased in weight by 21 lb., and is now in robust health and without a symptom. She has been married to-day—November 10th.

CONCLUSION.

I have undertaken to present to you some of the confirmatory evidence obtained by a band of fellow-workers, that the hypothesis expounded is not only correct in its essential particulars, but also from every possible angle, including that of the ultimate test, it appears to be—may I say—proven.

I set out to show you that malignant neoplasia is a specific growth process in that it is a reversion on the part of the starving cell to the nutriment-seeking proclivities of its ancestral type, the chorionic epithelium.

A comparison between the chemical constitution of different tissues in regard to the factors concerned in growth processes demonstrates clearly not only that malignant tumours are richer in this respect than the corresponding normal structures and innocent neoplasms of the same parts, but also that the physiologically malignant chorionic villi show even higher values than pathologically cancerous tissues. The chorionic epithelium is super-malignant.

In the search for a substance that will arrest or have a specific lethal action on cells which possess the chemical constitution associated with malignancy we have found only lead. This metal is specifically active in regard to the chorionic epithelium, to the cells of cancerous growth, to normal embryonic growth, and to mature cells rich in phosphatides.

Some day we hope that a substance, less toxic to the organs of the patient that are rich in phosphatides, and even more effective than lead in arresting and destroying cancerous tissues, will be found. If that should ever happen, and it is not unlikely, we shall have still further confirmation of our belief that causes are as nothing in comparison with the importance of the realisation that malignant neoplasia is a specific process of the nature, and subject to the control I have described.

Bradshaw Lecture

ON

GASTRO-JEJUNOSTOMY.

Delivered at the Royal College of Surgeons of England on Nov. 11th, 1925,

BY JAMES SHERREN, C.B.E., F.R.C.S. ENG.,

VICE-PRESIDENT OF THE COLLEGE; SURGEON TO THE LONDON HOSPITAL.

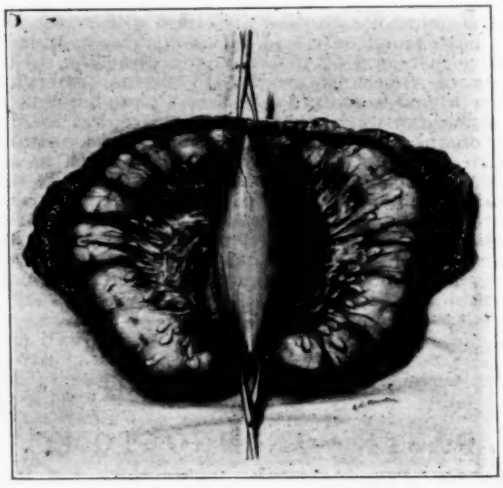
I MUST apologise for having selected an operation as my subject. I did so because of a firm belief that gastro-jejunostomy has had a more profound influence on abdominal surgery, and has done as much, if not more, for the good of the human race than any surgical procedure. On the other hand, carried out in unsuitable cases, or in suitable cases in an incorrect manner, it has, I regret to say, done as much, if not more harm, not only to the patient but to surgery in general than any operation. In suitable cases and correctly applied it has altered the whole outlook of countless chronic dyspeptics, and saved numerous valued lives for long service to the community. In addition to its widespread influence on abdominal surgery, the light it sheds on the ætiology of ulcerative lesions of the stomach and duodenum and on the cause of their symptoms was also a factor which convinced me, and I hope will convince you, that its study is eminently suitable for a Bradshaw lecture.

The present time seems opportune to review the matter, as from many sides we hear of its failure to cure conditions that are found curable by its aid in the hands of other surgeons. We have large and complicated procedures devised to supplant it, procedures that carry with them a mortality greater than that of the operation under discussion, and I venture to say that the death-rate of these would at least approximate to that of gastro-jejunostomy and to all its unsuccessful cases if they were considered as fatalities. Not even the most ardent advocate of these new operations would claim that every survivor was cured.

I should like first to draw your attention to a few points of historical interest. It was first carried out on Sept. 28th, 1881, in Vienna, by Anton Wölfer,[1] while assistant in Billroth's clinic. The patient was a male of 38, Michael Gold, surely a name to be remembered in the annals of surgery. He was suffering from pyloric carcinoma. Convalescence was uneventful and he was reported well four weeks later. The second case was done by Billroth himself on

Oct. 2nd, the patient being a man of 45. Bilious vomiting supervened the following day and continued until death on the tenth day. A post-mortem examination showed spur formation. Thus, the distressing post-operative symptom of regurgitant vomiting appeared early in its history. The course of abdominal surgery might have been different had this been the first case

FIG. 1.



Showing the posterior surface of the stomach brought through the mesocolon and held vertically from the greater to lesser curvature, ready for the application of the clamp.

operated on. A surgeon must be thoroughly convinced of the soundness of his conception and its potentialities who would attempt it a second time in the face of such a result. The first successful gastro-jejunostomy in this country was carried out by Barker[3] for carcinoma of the pylorus on Jan. 5th, 1886. A day previously Morse,[3] assistant surgeon to the Norfolk and Norwich Hospital, had done a similar operation and both surgeons sutured the jejunum to the stomach before opening them. It was first performed in this country at the London Hospital by Reeves [4] on May 9th, 1885, on a woman of 40, with carcinoma of the pylorus. It is difficult from the brief account to follow exactly what was done, but it was a two-stage operation. I have been unable to obtain any information other than the short note published, and a careful search of the hospital records and operation books has not enabled me to trace the patient.

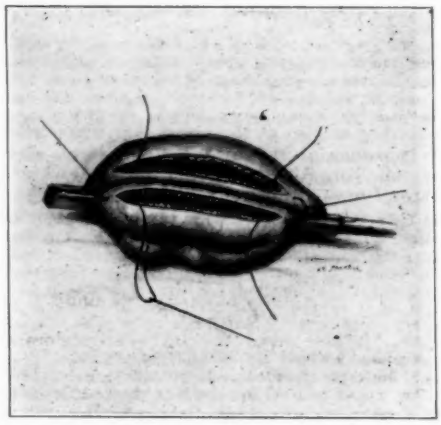
Carried out first for the relief of symptoms in irremovable carcinoma of the pylorus, it has been used in the treatment of most abdominal ills and, in cases that have come under my own observation, has been done or advised for the vomiting of pregnancy, disease of the spine and spinal cord, of the kidneys, and even of the middle ear and brain. It was not until 11 years after its introduction that Doyen[5] employed it in the treatment of chronic gastric ulcer. This is recorded in a most instructive paper. He was led to undertake the operation on the supposition that pyloric spasm played a large part in producing symptoms. The first patient was operated on in 1892 for the round type of chronic gastric ulcer, and was quite well at the time of his report three years later; during this interval he had operated on 14 other patients suffering from chronic gastric ulcer without pyloric stenosis. He was rapidly followed by others, and on March 22nd, 1893, it was first employed by Codivilla[6] in the treatment of chronic duodenal ulcer. This was in a male of 40 who was quite well five years later, and it was not until after this, to be exact on May 5th, 1898, that the second case was operated on by this surgeon. Surely an example of surgical patience we should all take to heart. If every operation were tested for a few years before being generally employed many procedures would be justly unknown to any but their inventors.

The first gastro-jejunostomy was anterior with a long loop, the jejunum being sutured to the stomach along a horizontal line with its proximal portion towards the pylorus (retro-peristaltic). In 1885 von Hacker [7] introduced the posterior operation, leaving a loop 20 cm. from the duodeno-jejunal flexure. It was 15 years later that Petersen [8] further improved it by shortening the loop and adopting the iso-peristaltic position of the jejunum introduced by Rockwitz [9] in 1887.

We thus see the international character of surgical work. This operation was conceived in Vienna and its first modifications came from the continent of Europe. Its extension to the treatment of chronic gastric ulcer we owe to the French, to chronic duodenal to the Italians. I do not think, however, we shall be claiming too much for the English-speaking races if we say it was brought to perfection by them, and the names of Moynihan and Mayo will always be associated with this.

It is impossible to give the many variations that have been advised and carried out from time to time, but the next great advance was the advocacy of the vertical position of the anastomosis by Sir Berkeley Moynihan. This was in an important paper entitled "Gastro-enterostomy and After,"[10] which was the first serious estimation of the value of this operation and its after-results. It contains these striking words: "I am an ardent and a sanguine advocate of this operation, than which I think there is none in all surgery more completely satisfactory." When carried out in suitable cases this is an opinion which I to-day still share. It is difficult to understand the very conflicting results reported as obtained after gastro-jejunostomy except on the supposition that they are due to want of appreciation of its indications and of the correct method of carrying it out; if success is to

FIG. 2.



To illustrate the first insertion of the through-and-through sutures.

be obtained meticulous care is necessary at each stage. On the one hand, we have a paper written with the title "Gastro-jejunostomy as a Disease"[11]; on the other, we find from the statistics published from the Mayo Clinic[12] that they have a cure rate of 94 per cent. in duodenal ulcer after treatment by gastro-jejunostomy and of at least 85 per cent. after the same operation for the treatment of chronic gastric ulcer. No surgeon who knows the work of this institution, and most of us have been welcomed there, can doubt the accuracy of these figures.

I should first like to describe the operations I carry out at the present time. The one which has given

uniform success in my hands is the posterior retrocolic with vertical opening. The jejunum is taken at the duodeno-jejunal flexure and brought to the stomach so as to lie easily without tension on the one hand or looping on the other; the exact part therefore of the jejunum which is anastomosed to the stomach depends on the size and position of that organ. An

FIG. 3.

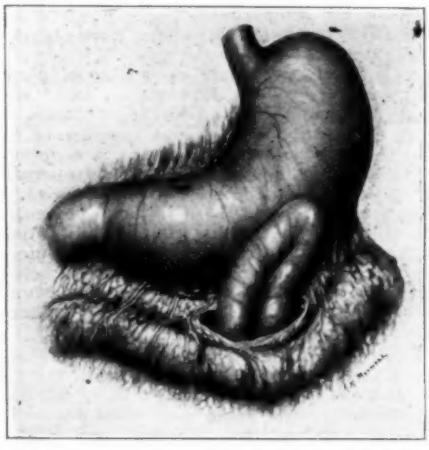
Showing the posterior surface of the stomach exposed and brought out through the gastro-colic omentum, the jejunum being brought to it in front of the colon.

opening is made in the transverse mesocolon immediately above the flexure, sufficiently large that its edges can be easily sutured to the stomach after the anastomosis has been made without causing deformity to it or the jejunum. The stomach just to the right of the cardiac orifice is clamped vertically from the greater to the lesser curvature (Fig. 1). If the operation is being carried out for a chronic gastric ulcer the anastomosis must be to its cardiac side; making it elsewhere is useless and the cause of many failures. This is even now not recognised universally, and sufficient stress has not been laid on this elementary fact. However the curative results are brought about, good cannot be anticipated when the opening is made to the pyloric side of the ulcer.

The jejunum is brought to the stomach without a clamp and fixed to it at either end by stay sutures placed so as to secure its opening being exactly at the antimesenteric border and thereby avoid any rotation of the gut on its longitudinal axis. I find this much simpler to accomplish if no clamp is placed on the jejunum. Further, as I have stated before, it is possible that pressure of the clamp may in some instances be one of the causes of jejunal ulceration. No rule can be laid down with regard to the size of the anastomosis; it should extend when possible from the greater to the lesser curvature. This, of course, cannot be done if there is great dilatation; here, while falling short of the lesser, it should reach to the greater curvature. The viscera are then opened and the stitch through all their coats inserted. It is most important to get absolute apposition of mucous membrane so that I do not remove any that is redundant, and pay particular attention to the ends of the incision, uniting these first (Fig. 2). Nowadays the rare cases of gastro-jejunal ulcer are usually found at either end of the anastomosis, I believe due to failure of primary union of mucous membrane here, and it is for this reason that great care is necessary at these points. Before inserting the anterior layer of sutures I loosen the clamp and look for bleeding points. Finally the edges of the opening in the meso-colon are carefully united to the stomach at least half an inch away from the line of anastomosis. Where the mesocolon is very fatty, and the fact that the great omentum is in similar condition makes the posterior operation advisable, I carry this out as the first stage, so as to be certain that the oozing edges shall be well removed from the suture line and so avoid puckering or obstruction from adhesions later. Special care is necessary in dealing with these edges; all oozing should be stopped and the points I have stressed adhered to to avoid the possibility of late post-operative vomiting.

It may, however, be impossible or unwise to perform this retrocolic posterior operation on account of changes in the mesocolon, or adhesions of jejunum to its under surface. If the mesocolon is loaded with fat, or if it is shrunken and adherent to the posterior abdominal wall, operation through an opening in it may lead to severe late regurgitant vomiting. I am also very much averse for the same reason, when a considerable length of the jejunum is united to the under surface of the mesocolon, to separate it, as these adhesions may re-form and cause obstruction. I also think it is unwise to attempt the retrocolic operation if an opening of sufficient size cannot be obtained without dividing one of the vascular arcades. For several years I have carried out an antecolic posterior operation with a short loop in this type of case. The posterior surface of the stomach is exposed by an opening in the gastrocolic omentum, and the jejunum, brought in front of the colon at the splenic flexure, is united vertically to it (Fig. 3). In my hands this has given excellent results. When the posterior surface of the stomach is adherent and partial gastrectomy is unwise or not indicated, I do the anterior no-loop operation that I first performed in 1904 and published in 1907,[13] bringing the jejunum to the anterior surface of the stomach through the transverse mesocolon and gastro-colic omentum

FIG. 4.



Illustrating anterior no-loop gastro-jejunostomy, the jejunum being brought to the anterior surface of the stomach through the mesocolon and gastro-colic omentum.

(Fig. 4). The opening is finally sutured around the anastomosis in the way I have described in dealing with the normal posterior operation. I have used Lukens' special catgut, No. 0, for suturing gastro-intestinal anastomoses for many years with uniform success.

I believe that many of the recorded bad results of this operation are due to the way in which it is performed. It is not enough to unite the jejunum to the stomach anywhere, the spot must be chosen as I have indicated, and the opening must be of sufficient size. I should like to illustrate published examples of

methods of anastomosis which I do not think are best calculated to bring about the healing of ulcers and reduce gastric acidity. The first[14] is given as an illustration of normal gastro-jejunostomy (Fig. 5); you will see that the opening is horizontal, and that a considerable loop is left. The second is from a paper, unfavourably criticising this operation in the treatment of ulcer of the lesser curvature (Fig. 6). I agree that the type of operation here figured[5] is not the one most likely to lead to cure of the ulcer; it is horizontal and does not reach the greater curvature. To ensure healing the opening should be in the direction shown in Fig. 7.

INDICATIONS FOR GASTRO-JEJUNOSTOMY.

What are the indications for this operation? It is still necessary to state that it should only be carried out for the treatment of a lesion that can be seen, not on account of symptoms, however definite they may appear to be. In the first place, it is the operation that should be performed when surgical treatment has been decided upon in a case of chronic duodenal ulcer. It is rarely that any other procedure is necessary. The operation of gastro-duodenostomy has failed, in my hands, to bring about a satisfactory post-operative reduction of acidity and is more often followed by secondary ulceration. In my opinion duodenectomy has nothing to recommend it.

I should like to give examples comparing the pre- and post-operative fractional meals of patients with chronic duodenal ulcer, recently treated by gastro-jejunostomy and by gastro-duodenostomy. Figs. 8 and 9 are from a male patient operated on by me for chronic duodenal ulcer, after having had symptoms for ten years. With such a result one can certainly say that further trouble is extremely unlikely. Figs. 10 and 11 are from a female patient, operated on after 15 years history. There was a scarred ulcer constricting the first part of the duodenum, which was mobile and dilated. For this reason gastro-duodenostomy was feasible and was carried out with a wide opening. In spite of regurgitation, as shown by the presence of bile and a rapid emptying demonstrated by a barium meal, the chart shows great post-operative acidity. I shall be surprised if this patient does not develop further symptoms.

Gastro-jejunostomy is my operation of choice in chronic gastric ulcer when the ulcer is "free," without suspicion of malignancy, and the anastomosis can be made to its cardiac side. The statements in the paper to which I have just referred[16] are opposed to my experience of the results when the operation is carried out on the lines I have described. The following sentence occurs in it: "I have records of patients who got no benefit from it, and when the abdomen was opened after several years the ulcer still persisted." I also have records of this description, but they apply only to those patients in whom the operation was incorrectly performed, or for whom this treatment was unsuitable.

The following is an example:—

L. C., a male, aged 45, was admitted to the London Hospital under my care in December, 1924. He had had gastro-jejunostomy performed at another hospital nine years previously and had not been relieved in spite of the fact that his test-meal revealed an absence of free HCl and a total acidity of 16. Barium meal showed some delay in emptying, most of the meal being present at the end of an hour. At operation I found a large ulcer "free" on the lesser curvature. The gastro-jejunostomy was small, posterior, and near the pylorus, with no trace of secondary ulceration. After excising it I did my usual operation to the cardiac side of the ulcer. He did well, but died of another cause nearly three months later and I was fortunate in being able to obtain an account of the post-mortem. The gastric ulcer had absolutely healed and the anastomosis was perfect.

This is a very striking instance showing that it is useless to carry out the anastomosis to the pyloric side of the ulcer and illustrates a point I shall deal with later, that the post-operative gastric acidity has no bearing on the healing of the original ulcer. This patient obtained no relief after a gastro-jejunostomy performed to the pyloric side of the ulcer, even though it had brought about achlorhydria, but secured immediate relief and cure of the ulcer when it was done to its cardiac side.

Gastro-jejunostomy should never be advised in acute ulcers with hæmatemesis; it has no influence on this condition. In simple organic stricture of the pylorus, whether due to the cicatrisation of a duodenal ulcer or to any of the more unusual causes, it is the operation of choice. In hour-glass stomach in which the causative ulceration has healed it is of the greatest service, and if pyloric obstruction is present as well may necessitate a double operation. The results of double gastro-jejunostomy are excellent. The first, done 15 years ago, is, and has remained quite well, and all others have been equally satisfactory. That it is not often called for the following figures will show. I have operated on 135 cases of hour-glass stomach due to simple ulceration and in only seven has it been necessary. In the majority a penetrating adherent chronic gastric ulcer was present, indicating the need for partial gastrectomy. It is valuable in carcinoma which is irremovable and causes pyloric obstruction, but not otherwise.

RESULT OF THE OPERATION.

The mode of action and the result of the operation are closely related. The symptoms in chronic gastric and duodenal ulcer are due to spasm or irregular muscular action of the pylorus and pyloric portion of the stomach in duodenal ulcer, and of the body of the stomach in gastric ulcer and to the increased tension produced thereby. Who that has seen the progress of a case after gastro-jejunostomy for ulcer in those perhaps somewhat unusual instances where the pain is so severe as to necessitate the use of opium, and has noted the immediate post-operative relief obtained, will doubt this, and that the relief is due to the mechanical and not to the physiological or, as I prefer to call it, chemical effect of the operation. All who have watched on the screen the marked spasm in chronic gastric ulcer, and in addition their regular peristalsis in chronic duodenal ulcer, will realise that this is a factor which prevents healing. This spasm results in the meal passing at first chiefly by the new opening even in those cases, and they are in the majority, in which no organic stenosis is present. The effect of the operation is to cause more rapid emptying of the stomach and immediately to relieve gastric tension. Its action on the ulcer itself, therefore, is mechanical—that is, it gives the ulcer rest. I have yet to see failure of healing in suitable cases, and I have published many at various times in which I have had an opportunity of examining the stomach and duodenum post mortem or at second operation at long periods after the primary procedure. If healing were due solely to an alteration in the chemistry of the stomach chronic gastric ulcers would heal, even though the anastomosis were placed on their pyloric side and duodenal ulcers would not heal unless there was satisfactory change in gastric acidity. I have had to reoperate on several cases, the primary operation having been carried out by others, one of which I have just quoted, in which in spite of achlorhydria the lesser curvature ulcer was unhealed, the anastomosis being made to its pyloric side, and Ryle,[17] in his Goulstonian lectures, has published an example. It is my experience that chronic duodenal ulcers heal as the result of gastro-jejunostomy, even in those cases in which it does not bring about any profound change in gastric acidity. The operation brings about healing of the ulcer, whether gastric or duodenal, when carried out on correct indications.

On the other hand, from the patient's point of view, the permanent relief of symptoms, it is essential that gastric acidity be markedly diminished even to the abolition of free HCl to prevent fresh ulceration either in the jejunum or at the anastomosis should any infective focus be overlooked, or the mucous membrane fail to heal by first intention. But every patient in whom operation fails to reduce acidity does not develop further symptoms; it is only when

FIG. 5.

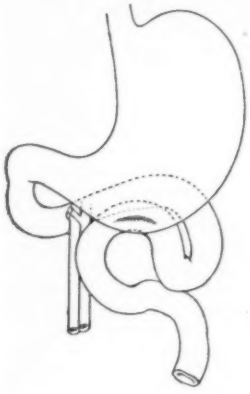


FIG. 6.

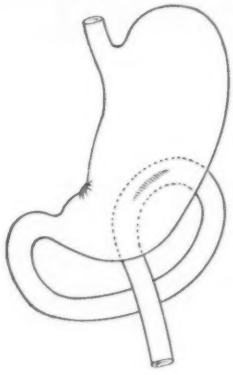


FIG. 7.

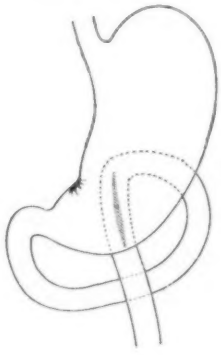


FIG. 12.

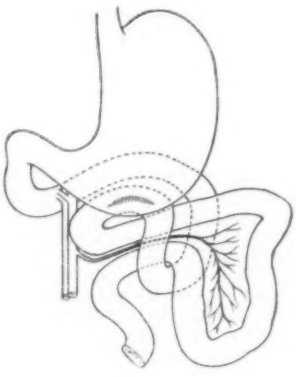


FIG. 8.

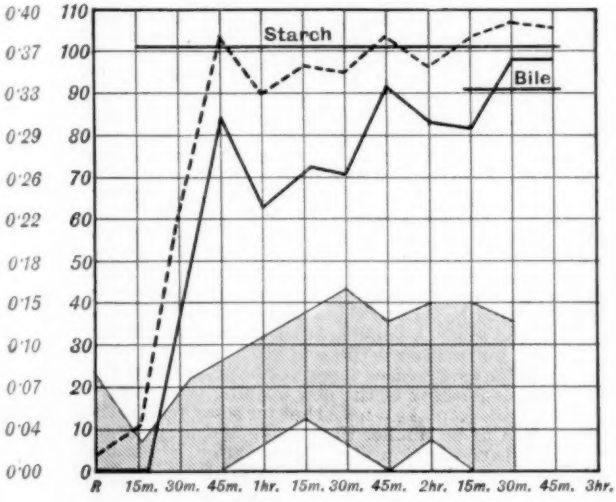


FIG. 9.

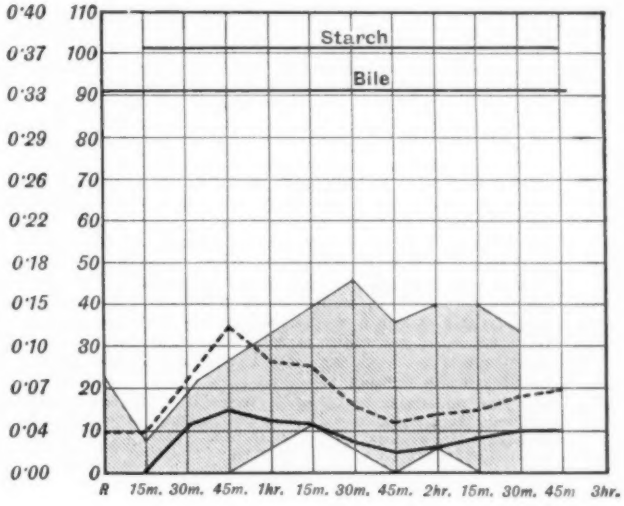


FIG. 10.

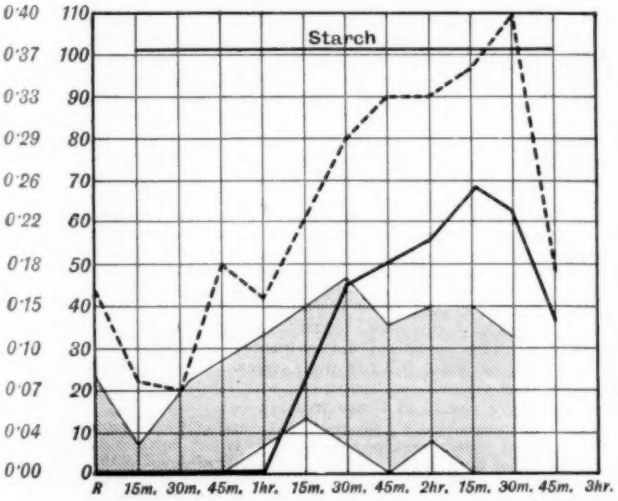
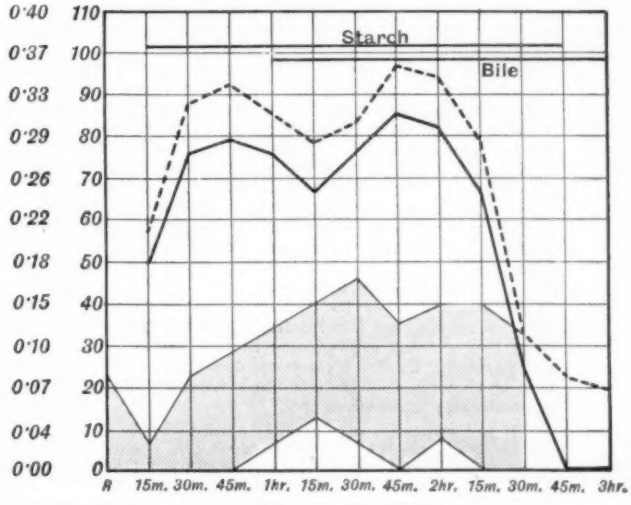


FIG. 11.



In all the charts the continuous line —— indicates free HCl; the broken line .... total acidity; the shaded area represents *the limits of free HCl* in 80 per cent. of healthy males (Bennett and Ryle). The figures at the left hand side of the charts indicate N/10 NaOH (per cent. HCl).

some other cause is present such as I have just mentioned.

Failure to reduce gastric acidity has no bearing whatever on the healing of the original ulcer; the operation is "mechanical" so far as this is concerned, "chemical" in its prevention of further disease. I am convinced that post-operative acidity is the predisposing cause of post-operative ulceration and that its great reduction is to a certain extent within our control; a large opening far removed from the pylorus brings about a greater lowering than a similar or smaller one close to the pylorus. I gave my reasons for this belief in my Hunterian lecture.[18] Recently Walton[19] has advocated a similar position for the anastomosis.

What are the causes of the post-operative lowering of acidity which almost invariably takes place after gastro-jejunostomy carried out for the treatment of chronic gastric ulcer, usually to as large a degree as after partial gastrectomy, and fails in some cases of chronic duodenal ulcer? I am certain that reflux of duodenal contents into the stomach is the principal factor. It has been satisfactorily proved that the pancreatic juice is the neutralising agent. In most cases of chronic gastric ulcer the anastomosis must from the necessities of the case be made well to the cardiac end of the stomach. But there is another factor besides that of the position of the stoma. The operation may be carried out on exactly similar lines in two patients of the same age and sex on the same day for the same condition with similar pre-operative meals. In one the post-operative meal reveals an absence of free HCl and a total acidity of 20, in the other one of 0·1 and 50. I shall have much more to say on this subject later, but I am convinced that it is in some way bound up with the use of the pylorus. It is possible that the production of secretin in the duodenum activating the pancreatic secretion may play a part, but I am inclined to the opinion that for the most efficient reduction neutralisation via the pylorus as well as the stoma is required. In support of the view that want of sufficient neutralisation is the cause of post-operative hyperacidity I will quote Bolton's[20] words on the subject:—

"The essential cause of hyperacidity of the gastric contents is a deficiency in the neutralising process which regulates the acidity of the contents." And again, "The important point to note is that the condition hyperchlorhydria is the result of neuromuscular irritability of the stomach in which the pylorus plays chief part."

In the section dealing with gastric acidity following gastro-enterostomy, he writes as follows:—

"Following gastro-enterostomy the secretion of gastric juice remains unchanged, any alteration in the acidity curves being due to neutralisation by regurgitation of intestinal contents through the stoma."

H. J. Paterson,[21] who has been an ardent supporter of gastro-jejunostomy and whose writings on the subject are classical, holds the reduction of acidity to be due partly to regurgitation through the stoma and partly to a diminution in the total chlorides secreted, and considers the action of the operation physiological, the result of this reduction of acidity, which he rightly deems necessary for the certain cure of the patient. But the ulcer heals after the operation correctly performed no matter what the gastric acidity, so that from the point of view of healing of the original lesion its action is not physiological.

Although failure to reduce post-operative acidity has no bearing on the healing of the original ulcer, it is of the utmost importance in the future welfare of the patient. I have on several occasions drawn attention to this, the last time in these words when speaking of secondary ulceration:—

"If the operation permanently abolishes free HCl in the gastric juice, chronic ulceration does not occur. I drew attention to this in my Hunterian lecture, and, for reasons there given, consider it an important cause. I think there is no doubt that a large opening removed from the pylorus produces the greatest lowering of gastric acidity, and interference with the pylorus by exclusion or the presence of adhesions is an important factor in keeping up the post-operative acidity."[22]

I have revised the figures there given up to the end of June, 1925. Out of 195 personal cases of chronic gastric ulcer treated by gastro-jejunostomy in whom pre- and post-operative test-meals were given, in not less than 157 free HCl was abolished and total acidity markedly reduced, in all to below 30. In 26 it was greatly diminished, and in only 12 was it not reduced below normal. Of the duodenal ulcers, similarly brought up to date, 340 in number, in 206 there was absence of free HCl in the post-operative test-meal with a low total acidity, in 79 there was a satisfactory reduction, and in 55 there was little or no reduction. I wish to repeat again what I consider of the utmost importance—no case of secondary ulceration arose among those in whom the post-operative acidity was greatly reduced, and that the patients in whom further symptoms developed were from the group in which there was little or no reduction. It has been my experience that in many of the cases in which there is insufficient lowering of gastric acidity there is interference with the free action of the pylorus, and in these X ray examination shows that the barium meal is leaving chiefly or only by the stoma.

I am convinced that pyloric occlusion at the time of operation is a fertile cause of failure to reduce gastric acidity. Much has been written on this subject which it is difficult to reconcile. Donald Hunter[23] states that it had no effect on post-operative acidity, but on looking at Table VIII. I found these figures: 19 cases without pyloric occlusion, free HCl abolished in 10, remained high in 5, became higher in 4; 21 cases with pyloric occlusion, in only 8 was free HCl abolished, it remained high in 8, and became higher in 5. This is surely evidence that it affects unfavourably the post-operative reduction of gastric acidity. Apperley[24] studied 27 cases by post-operative fractional test-meals and was convinced that pyloric occlusion had no effect on gastric acidity, but that failure in reduction was due to a faulty stoma. I have already mentioned that a failure in satisfactory reduction may be due to the anastomosis being made near the pylorus; a small inefficient stoma will also be a cause, but neither is the sole explanation. In the majority of my own cases there has been no difference in the size or position of the new opening, and in very few did I have to make a note that for some reason the opening had to be smaller than I like and its position unusual. Investigation by X ray after a barium meal in those in whom there was little or no reduction showed that the stomach emptied as rapidly by the stoma as is usual after gastro-jejunostomy. I could discover no difference in this respect between those in whom free HCl was abolished and those with a high post-operative acidity.

Guy[25] examined by the fractional method 26 cases after gastro-jejunostomy. They were distributed as follows: gastric ulcer, 3; pyloric ulcer, 9; duodenal ulcer, 14. He argues that the reduction in gastric acidity is more marked in gastric ulcer because the pre-operative acidity is less and applies the same to pyloric ulcer, a misleading term that I should like to see abolished. Speaking of duodenal ulcer he states:—

"Since duodenal ulcers are accompanied by such marked hypersecretion, a much smaller reduction in acidity after gastro-enterostomy is to be expected. It has been found invariably that a considerable degree of acidity exists after operation, and a study of the acid curves shows that a reduction to about half of the pre-operative acidity is the maximum that has been obtained. That is, the gastric secretion is now brought within the limits of normal acidity."

This is totally opposed to my experience of the condition. The figures I have quoted entirely disproved this, at least for my own cases. He traverses the view that pyloric exclusion has any bearing on the post-operative result in these words:—

"The view expressed by Sherren that duodenal exclusion is the cause of post-operative hyperacidity is not borne out, as it has been demonstrated that a high acid level after operation is but the natural result of an excessive pre-operative hypersecretion and is not affected by variations in operative procedure apart from the provision of a stoma,"

but does not give the evidence upon which he bases the statement. Bonar,[26] in a study of gastric function

before and after gastro-jejunostomy, also used the fractional method. In 14 cases of chronic gastric ulcer there was an absence of free HCl in 80 per cent., and in the remaining 20 per cent. a marked hypochlorhydria. In 33 cases of duodenal ulcer the fractional meal before operation showed a high acidity in an hour—that is, at the time corresponding with the Ewald meal. After operation he states that marked hyperchlorhydria was still present and that it was marked in three-quarters to one hour—that is, at the corresponding interval to that before operation. This again is not my experience. My results certainly do not bear out his statement that, "In the case of ulcers with high acidities gastro-jejunostomy does not cause to any extent a reduction of the acidity." I have notes of a considerable number of cases examined by the fractional method, though small when compared with those done by the single examination, the results at the hour both before and after operation correspond fairly well with those obtained by the single meal. I am still of the opinion that for diagnostic purposes the single test-meal before and after operation gives all the information necessary; certainly in hospital work it has given me results which correspond more closely to the clinical and operative findings than the fractional. Thus in the case illustrated by Fig. 10, in the fractional meal it will be seen that at the end of an hour there was no free HCl and a total acidity of 43, whereas the Ewald meal that I had given, as this was so unconvincing, showed free HCl 0·23 and total acidity 72, a test-meal corresponding with the condition found at operation. In a long experience of Ewald test-meals in chronic duodenal ulcer I have never had a result of this sort, but have had similar very puzzling discrepancies with the fractional meal. I have abandoned examination by this method except in an endeavour to throw light on exceptionally difficult cases. My medical colleague, Dr. Robert Hutchison, agrees that the "old 'single' or Ewald test-meal is to be preferred to the more modern 'fractional' type."[27] The investigations were all done in the London Hospital clinical laboratory under the supervision of Dr. P. N. Panton, without whose help these conclusions would have been impossible.

Ryle,[28] in his admirable Goulstonian lectures, deals in the third with gastro-jejunostomy and its sequelæ. Speaking of the post-operative reduction of gastric acidity he says that a case with deficient or low motility is more likely to respond to gastro-jejunostomy than one with increased motility; or in terms of the test-meal, a case with a steadily climbing curve is more likely to give a good result than one with a high abrupt peak of acidity and rapid evacuation. In my experience there is certainly no direct connexion between the time of emptying before and after gastro-jejunostomy and the acidity. He quotes me as saying we have yet to learn what is the cause of the failure to reduce post-operative acidity, but did not give my views on the subject that it is due to insufficient use of the pylorus and that for the most effective lowering of acidity it is essential that the pylorus be used as well as the new opening.

The results of the operation when done for chronic duodenal ulcer and picked cases of chronic gastric ulcer have been excellent. Failure to cure the patient occurs, apart from gross mechanical causes of which I shall speak later, or from overlooking lesions of other abdominal organs, only in that group in which there is insufficient reduction of post-operative acidity. Realisation of this is essential and improvement in our results will only come when our work is checked by this knowledge. Devine[29] states that "65–70 per cent. of gastro-jejunostomies for all types of duodenal ulcer were successful. This seems to depend chiefly on the ability of the operation to diminish greatly or abolish acidity." He adds, "Gastro-jejunostomy must therefore remain the basis of average gastric surgery," and considers that it should be, but is not, an ideal procedure. He mentions that the unsuccessful gastro-jejunostomies fell into a group in which there was an increase or little modification of acidity after operation, and that this was due to failure of alkaline regurgitation.

Success with this operation will depend on the care with which it is carried out along the lines I have suggested. Those of us who have obtained good results have been criticised. Pannett,[30] for example, speaking of those who claim 90 per cent. successes, says there is "obviously some radical difference in the manner of evaluation." I should rather say in the exact manner in which the operation is carried out. In a further paper[31] he gives the names of those with cure rates in the region of 90 per cent. Speaking of my own figures I have followed these cases up from the very first and have counted as "quite well" only those patients who have been perfectly well throughout; if they have any digestive complaints they may be included among those improved, but not among the 90 per cent. All patients are seen at 3, 6, and 12 months after operation and heard from yearly till after the third year. I shall give an example later. I have again brought the earlier cases up to date and confirm what I have said before, that the longer the cases are traced the better the result, and most of those who had minor troubles in the first year lost them later and had completely forgotten eight or ten years after that they had occurred. I can speak for the thoroughness of the follow-through method of my colleague Mr. Walton,[32] who has recently described it. The Mayo Clinic needs no defence from me. The results published in the paper from which my figures are taken[33] are better than those of four years previously, owing, I believe, to increased skill in carrying out the operation due to following up all the patients carefully and improving technique; several of the patients then not well are now well. Balfour's[34] figures in chronic duodenal ulcer are an eloquent testimony, 88 per cent. quite well among 1000 patients. Metraux[35] in the study of cases in Roux's clinic found that in 90 per cent. of the cases of chronic gastric or duodenal ulcer treated by gastro-jejunostomy alone a good result was obtained. Peck[36] wrote that simple gastro-jejunostomy properly performed is curative and adequate in the great majority of chronic duodenal ulcers, and that from 80 to 90 per cent. are completely relieved of their symptoms and remain well as they are followed from year to year. We cannot dismiss these figures as due to insufficient care in estimating results as Pannett has done, but rather look to the nature of the operation that others are doing and see if this will not account for their less satisfactory results. If the figures I have quoted from various writers of the failure to reduce gastric acidity after gastro-jejunostomy for duodenal ulcer are an index there is certainly a reason for its failure in many cases.

To sum up, gastro-jejunostomy carried out on modern lines will bring about the healing of all uncomplicated cases of simple chronic gastric and duodenal ulcer. Cases in which the floor of the ulcer is formed by pancreas or liver, or in which there is any suspicion that it is malignant, must be treated by partial gastrectomy. Cure of the patient—that is, complete and permanent abolition of symptoms—will be brought about in at least 90 per cent. of the cases, among the eight or nine not cured seven will be minor complaints, and not more than 2 per cent. secondary ulceration. When such a result can be brought about at a risk of less than 1 per cent. it is obvious that this operation has a permanent place in surgery. I have found no difference in the cure rate of those with organic pyloric obstruction, chronic duodenal ulcer without obstruction, or free lesser curve ulcers. I have obtained equally good results when I have been compelled to use my anterior operation. The first case was in December, 1904, and in this instance I was able to prove that the ulcer was healed at post-mortem 18 months later after accidental death. I have traced a woman operated on in January, 1908, now 74 years of age, without abdominal trouble. A male patient of 39 with a very indurated lesser curve ulcer operated on in July, 1913, remains quite well. I first carried it out in the treatment of chronic duodenal

ulcer in a male of 48 on Nov. 11th, 1908. He had an indurated ulcer involving both surfaces of the duodenum; he is now, and has remained throughout the 17 years, quite well.

COMPLICATIONS.

We now come to the principal complications. They may be divided into: (1) Failure to produce healing of the original ulcer or its recurrence; (2) secondary ulceration; (3) intestinal obstruction including regurgitant vomiting; (4) late development of carcinoma.

Failure to Secure Healing or Recurrence.

(1) As I have many times stated I have never found a duodenal or gastric ulcer unhealed at a second operation or post-mortem when an efficient gastro-jejunostomy had been carried out in a suitable case, and my experience now extends to over 100. To prevent anyone thinking this is evading the issue I will state if the ulcer was free and the anastomosis carried out on the lines I have laid down. Where there has been chronic perforation with erosion of the pancreas or liver, a small part of the ulcer sometimes remained unhealed. They are cases in which I recognise that gastro-jejunostomy is not the ideal procedure, but even in many of these it has promoted healing. I was astonished recently on going over my old operation notes to find in how many, in which I had recorded that partial gastrectomy was the ideal operation but could not justifiably be done, the patient had remained absolutely free from all symptoms when traced for as long as 10 to 20 years.

The first case of this nature I operated on in which this note appears was a little over 20 years ago—a man of 33 with a seven years' history, which included two attacks of hæmatemesis. At the operation on Oct. 4th, 1905, I found a large saddle-shaped ulcer of the lesser curvature adherent to the pancreas and carried out posterior gastro-jejunostomy to its cardiac side. I traced him in the way in which I keep in touch with all the patients; I saw him three and six months after operation and heard in 1907, 1908, 1910, 1911, 1913, 1914, 1916, 1919, 1922, and saw him two months ago. He has never had any digestive complaint.

I cannot conceive of a better testimony to the value of the operation.

I have on several occasions found a chronic gastric ulcer unhealed at a second operation in cases in which the gastro-jejunostomy was done to its pyloric side; even if excision is added to this procedure and the gastro-jejunostomy done to the pyloric side of the excision wound, fresh ulceration is usual in the scar. Recurrence of the ulcer or failure in healing may occur in cases in which the gastro-jejunostomy opening has closed or become much contracted as the result of secondary ulceration. In the oft-quoted case recorded by Corner [37] of the fatal perforation of a chronic duodenal ulcer in a patient upon whom Sir Berkeley Moynihan had performed a posterior gastro-jejunostomy three years previously there was contraction of the opening. Corner stated: "There was no jejunal ulcer present; indeed, the gastro-enterostomy opening was very contracted." It is my experience that gastro-jejunostomy openings do not contract to any extent except as the result of marginal ulceration, and as, from the history, the patient had not been really free from symptoms this was undoubtedly the case. I would remark that the original operation was done in the early days in which marginal ulceration due to unsuitable sutures was by no means unusual. I can give a recent example which illustrates the two points, failure of healing or recurrence of the ulcer and closure of the gastro-jejunostomy opening.

A man at the age of 42 was operated on in 1915 by a surgeon, since retired, for a chronic duodenal ulcer with a history of 20 years' standing. Silk was used for the anastomosis. He remained quite well for 12 months and then began to get pain, which differed from that before operation by being in the lower abdomen. The attacks of pain were at first infrequent, but the intervals became shorter and the attacks longer, and when I saw him in February, 1925, he had had severe abdominal pain, which would wake him at night and for two or three years this had been in the upper abdomen. He was a thin man with an obviously dilated stomach. X ray examination showed that it still contained much of the barium meal at the end of seven hours and that little, if any, had passed by the stoma. At operation I found a large anterior duodenal ulcer. The gastro-jejunostomy opening was so small that it certainly measured no more than ¼ inch in diameter. My note says: "I have never seen an opening so contracted, it would have been possible to say that it had completely closed." I carried out posterior gastro-jejunostomy and he lost his symptoms at once.

In speaking of the development of fresh ulceration I have operated for chronic gastric ulcer ten years after gastro-jejunostomy for chronic duodenal ulcer and am able to show the specimen which is now in our museum.

In February, 1913, I operated on a woman of 43, who for 16 years had been having periods of pain after food with one attack of profuse hæmatemesis and melæna a year after the onset of symptoms. Her test-meal was 0·25 and 100. I found a large ulcer on the anterior surface of the first part of duodenum and did a gastro-jejunostomy nearer to the pylorus than I do now, and removed her appendix. Unfortunately no post-operative test-meal was given; at that time I did not have it carried out as a routine. She remained well for two years and then got an attack for which she kept her bed two weeks, a similar one in 1919, and again in 1923. Her barium meal report was: Penetrating ulcer lesser curvature towards cardiac end. Stoma normal. Duodenum functioning normally. Test-meal 0·10 and 35. At operation on June 8th, 1923, I found the duodenal ulcer healed and the gastro-jejunostomy opening perfect. Well to its cardiac side was an ulcer the size of a shilling, which had perforated and was adherent to the pancreas. I did a partial gastrectomy and she remains quite well. On examining the specimen the stoma was as large as the day I made it ten years previously.

In this case the ulcer was either overlooked by me at the first operation or formed later on the cardiac side of the anastomosis. It illustrates once again the uselessness of a stoma to the pyloric side of an ulcer.

Secondary Ulceration.

(2) Secondary ulcers are those which develop in the region of the anastomosis either true jejunal or gastro-jejunal. I still believe, in spite of Walton's [38] experience, that these are separate conditions, although we cannot differentiate them by their symptoms or their causation. Both are due to the action of gastric juice on tissue whose vitality is lowered. This may be from hæmorrhage, infection, or by the failure of union of mucous membrane exposing the underlying tissue. They occur in those cases and those only in which operation fails efficiently to reduce gastric acidity. I should like to repeat again that I have never known the development of secondary ulceration in any patient in whom operation has abolished or very greatly reduced the amount of free HCl in the gastric contents as noted in an Ewald meal. I should again like to emphasise its rarity in women and after operation for gastric ulcer; this I attribute to the infrequency of duodenal ulcer in this sex and after chronic gastric ulcer to the greater proportion of cases in which free acid is abolished and the total acidity is much lowered. In the unusual instances of chronic gastric ulcer with high acidity in which gastro-jejunostomy fails to reduce it there is a liability similar to that in chronic duodenal ulcer. The following is an example and illustrates several important points.

On July 10th, 1917, I operated on a male, aged 40, with the following history. He had five attacks of indigestion, pain late after food, not relieved by it but by occasional vomiting. In his last attack the pain waked him at night. In an attack a year previously he had been in hospital with hæmatemesis; test-meal 0·2 and 78. My own notes are as follows: Gall-bladder normal. Two very indurated ulcers on the lesser curvature, close to the pylorus. There were no outlying nodules and nothing definitely to suggest malignant disease, but had his condition been better I should have done partial gastrectomy. The jejunum was adherent to the under surface of the transverse mesocolon. I made my anastomosis nearer the pylorus than usual and found a considerable loop of adherent gut had been left between it and the duodeno-jejunal flexure. Appendix not removed. His post-operative test-meal—0·12 and 56—was unsatisfactory. I saw him on Sept. 3rd, 1917, and Nov. 4th, 1917,

and heard on August 8th, 1918, and Dec. 30th, 1922, that he was in perfect health. He then began to get attacks of pain two hours after food, relieved by vomiting recurring every four to six months. He was admitted to St. Mary's Hospital, and I am indebted to Prof. Pannett for these notes: X ray examination showed delay in the pyloric antrum, but the stoma functioning. Unfortunately no test-meal was given. At operation a gastro-jejunal ulcer was found at the left lower margin of the stoma. The gastric ulcers had completely healed.

This is one of the last cases in which thread was used for the outer layer, and I had to resort to it owing to a shortage of Luken gut. The ulcer was in the usual situation for a gastro-jejunal—that is, at one of the extremities—and I attribute it to working out of the knot of the suture leaving an ulcer which could not heal on account of the high gastric acidity. It is extremely uncommon for symptoms to recur after a lapse of over two years, even after the use of silk or thread for the outer layer of sutures and this is only the second case I have seen. It is an apparent exception to the "rule" that patients free from symptoms for two years do not develop secondary ulceration, but it is obvious that this could not apply to ulcer directly due to unabsorbable suture material in the outer layer as it may take years to work its way out, and if this occurs in a patient with normal or increased gastric acidity the formation of a chronic ulcer is probable.

There are thus, I believe, two factors. One is the failure to reduce gastric acidity. If this remains high then an area of lowered resistance, the result of undiscovered infection in the mouth or abdomen, or of hæmorrhage from puncture of a vessel during suture or bruising from the use of a clamp, may bring about ulceration in the jejunum. If, either from faulty suturing or unabsorbable material being used, the mucous membrane of the anastomosis does not heal by first intention, or, if healed, a suture or its knot works its way out, then gastro-jejunal ulcer may occur. The last true jejunal ulcer upon which I operated was last December. The history is so characteristic of the condition that I must quote it.

In November, 1920, I operated on a male of 45 for duodenal ulcer with a typical history extending over ten years. His barium meal showed the ulcer and his test-meal was 0·23 and 90. At operation: Gall-bladder normal, large ulcer anterior surface first part. Posterior gastro-jejunostomy carried out without difficulty and a fibrotic appendix was removed. His post-operative meal was 0·2 and 81. He remained well for five months only and then began to get pain late after food in the epigastrium and left iliac fossa. I took him in for treatment a year after operation with relief for a time; his test-meal was then 0·13 and 62. The attacks became worse, so that I operated last December; his test-meal was 0·19 and 62. The duodenal ulcer had healed; there was a chronic ulcer in the jejunum immediately distal to the anastomosis adherent to the colon. I excised it, closed the opening in the stomach and jejunum, and carried out pyloroplasty, with the result that his post-operative meal 14 days later was 0 and 33 and the stomach was empty in 25 minutes. He remains well.

The case I quoted last year[39] as an example of jejunal ulcer after gastro-jejunostomy was treated by partial gastrectomy on June 21st, 1921. He remained well for nearly two years and then began to get pain two hours after food. I admitted him again on Dec. 29th, 1923, and found that his gastric acidity was 0·09 and 40. He lost his symptoms while in bed, but ten months later developed diarrhœa and fæcal vomiting, and at operation on Nov. 21st, 1924, I found a jejuno-colic fistula. In this instance I had been unable to restore the lumen of the jejunum so as to carry out the usual partial gastrectomy, as I endeavour to do in cases of this type, and had to do a T-shaped anastomosis of jejunum to jejunum below the gastro-jejunal one, and this accounts for the recurrence.

The condition of secondary ulceration in my own practice is getting rarer with each series of cases. With regard to malignancy supervening on a gastro-jejunal ulcer, I have yet no definite case, but I still consider it a remote possibility.

To sum up, secondary ulcer is the result of failure of the gastro-jejunostomy to lower gastric acidity. But this post-operative excess of acid is not in itself enough, as we see that the ulcer for which the operation was performed heals. There must be some lowering of resistance, either a gap in the mucous membrane from faulty suturing, removal of too much mucous membrane, working out of unabsorbable suture, hæmorrhage, or infection. Their incidence can be lessened even if the condition cannot be completely abolished by careful dealing with all infection and scrupulous attention to all the details of the operation.

There is to my mind no doubt of the necessity for avoiding pyloric exclusion. A case published by Frankau[40] shows its effect experimentally. I am much indebted to him for further notes on the case which enabled me to trace the patient to his original surgeon and obtained fuller details.

In 1914 a man of 29 was operated on for duodenal ulcer. His test-meal was 0·2 and 76, but no post-operative meal was given. Symptoms recurred in nine months, and he was admitted to St. George's Hospital after several severe attacks of hæmatemesis and melæna. His test-meal then was 0·26 and 82. At operation an unusual condition was found, in that there was still a chronic duodenal ulcer present, but there were no signs of ulcer at the anastomosis or in the jejunum. The pylorus was clamped and divided. He remained well for 14 months, and then had abdominal pain, diarrhœa, and vomiting. He was reoperated upon and a jejuno-colic fistula was discovered.

The unfavourable result with pyloric exclusion is borne out by the experience of others. Haberer's[41] figures are instructive; among 265 cases of gastro-jejunostomy there were three cases of jejunal ulcer, but in 71 cases in which pyloric exclusion was added in the treatment of duodenal ulcer no less than 14 developed jejunal ulcers. Kummell[42] had previously pointed out its frequency under these circumstances. Finsterer,[43] who is now an ardent advocate of wide partial gastrectomy in the treatment of duodenal ulcer, writes that Haberer had 25 per cent. secondary ulcers with pyloric exclusion and posterior gastro-jejunostomy. Norman Dott[44] demonstrated experimentally that chronic peptic jejunal ulcer is the constant sequel of gastro-jejunostomy with pyloric exclusion in dogs. Von der Hütter[45] found in his experiments on dogs that jejunal ulcer did not develop in those cases in which the pylorus was patent, but that it was produced when pyloric exclusion by von Eiselsberg's method was carried out. Gussio,[46] from a study of cases of jejunal ulcer, came to the conclusion that its development is favoured by impermeability of the pylorus. Enderlen, Freudenberg, and von Redwitz,[47] as the result of experimental investigations on dogs, came to the conclusion that pyloric exclusion should be abandoned.

As we know that jejunal ulcers only arise in those cases in which there is failure to reduce post-operative acidity it seems to me obvious that interference with the pylorus is one of the causes of this. In 1921[48] I stated that most of my cases of jejunal ulcer occurred in those patients operated on between 1911 and 1913, when I carried out pyloric exclusion, and my observations since then on cases in which from any cause there was interference with the free function of the pylorus confirms this as there was a failure of post-operative reduction.

Ryle[49] states, "There is a greater liability to gastro-jejunal ulcers in young adults and in cases with a short dyspeptic history." As this was not my experience I have put it to the test so far as possible. I took all the cases of secondary ulcer, whether jejunal or anastomotic, that I have operated on, 44 in number; the youngest was 25 at the time of the original operation, the oldest 55, and the average age was 41·7. I then took the same number of consecutive cases of chronic duodenal ulcer, operated on over two years ago; the youngest was 17, the oldest 62, average age 40·4. I then took duration of symptoms before operation in the cases that developed secondary ulcer; the average was ten years, in the consecutive cases the average was 9·5. The number of cases is small, but there is an astonishing correspondence in the two series sufficient, I think, to controvert Ryle's statement. Such varying estimates have been given of the frequency of secondary ulceration that it is

difficult to discuss. In a recent paper Lewisohn [50] states that in a series of 68 cases re-examined 4–9 years after gastro-jejunostomy, 34 per cent. suffered from gastro-jejunal ulceration. As in a following paragraph he states, "Gastro-enterostomy does not reduce the hyperacidity even after many years," we seem to have the reason for this high percentage. My experience coincides with that of the Mayo Clinic that it is met with in less than 2 per cent. of the cases. Although in large series done in the one clinic the percentage is between 1 and 2 per cent., I still believe that even this can be lowered and should not like to think, as suggested by Walton,[51] "that the failure of the acid to fall in these gastro-jejunal ulcer cases may be due to an anatomical variation, the acid-producing cells in a certain number of duodenal ulcer cases (about 2 per cent.) being more widely distributed over the gastric surface and thus being less affected by the gastro-enterostomy." To me this is tantamount to saying we can do no more.

It must be remembered that excision of the ulcer with pyloroplasty or even doudenectomy does not protect the patient from secondary ulceration, and I suspect that its frequency is greater after both these, as pyloroplasty does not usually bring about so great a reduction of gastric acidity, and duodenectomy, like resection of gastric ulcer, will probably be given up on account of recurrence. Mann and Kawamura [52] found that after complete duodenectomy in dogs jejunal ulcer developed in two cases out of ten leading to perforation at 515 days after operation in one, and in the other it was found post mortem 383 days after.

None of the arguments from the secondary ulcer standpoint that have been brought against gastro-jejunostomy seem to me to be valid. It is the most serious drawback, but it is one that we are getting to understand as we realise that what is necessary is not merely a mechanical opening, but control of acidity. In many of the cases of failure to cure the patient other lesions in the abdomen have been overlooked, and I have had to remove the gall-bladder and appendix in these patients on many occasions after the failure of gastro-jejunostomy to cure all their abdominal ills. This should, of course, always be done if practicable at the time of the original operation and as part of the treatment in removing all possible sources of infection.

Intestinal Obstruction and Regurgitant Vomiting.

(3) The bugbear of the early operations, that of regurgitant vomiting, has almost disappeared. It is always due to obstruction. The gross variety which began immediately and continued till death or second operation has disappeared in modern practice. If it occurs now it is from the seventh to the tenth day, the obstruction being the result of the contraction of adhesions, due in most instances, I think, to organisation of blood-clot, causing change in and around the opening in the transverse mesocolon and is always mechanical. It needs one's ingenuity to circumvent the fat or contracted mesocolon and care to control all points of oozing, but I mentioned this in the earlier part of my lecture. But even this is now uncommon, and if it occurs usually yields readily to lavage. The minor cases of occasional bilious vomiting are the result of slight obstruction from rotation of the jejunum.

There are rare and late causes of intestinal obstruction that have been published from time to time, the commonest being that in which the jejunum passes from right to left behind the gastro-jejunostomy, the first published by Barker [53] in 1904 occurred two years after the operation. It is well seen in the drawings of the last case published [54] (Fig. 12) and in another by Bryan.[55] They all seem similar in that practically the whole of the small intestine passes through. It is a complication unlikely to occur after the posterior vertical operation; in both the anastomosis was horizontal. Herniæ through the opening in the transverse mesocolon occurred until this was obliterated by suture. This was recognised as early as 1902 by Moynihan. Retrograde intussusception has been recorded. The late Hamilton Drummond [56] published a case of retrograde intussusception following gastro-jejunostomy and was able to collect and review 13 others. These, however, are all extremely rare conditions and do not detract from the value of the operation.

Late Development of Carcinoma.

(4) We now turn to the possibility of the development of carcinoma in the scar of an ulcer at a time remote from the gastro-jejunostomy. Were this a frequent occurrence it would, of course, be a strong argument for carrying out partial gastrectomy in every case of chronic gastric ulcer. I would say at once that I have never met with this complication following gastro-jejunostomy for a duodenal ulcer, but in one further patient to the one quoted in my Hunterian lecture carcinoma of the stomach developed.

This was a man of 35 upon whom I operated in July, 1916, after a two years' typical history of duodenal ulcer. At operation he had a large ulcer of the anterior surface of the first part of the duodenum. The stomach was normal. He remained well for over three years and served in France. At the end of 1920 he began to lose his appetite and suffered from pain and vomiting. He died in February, 1921, and post-mortem revealed scirrhous carcinoma of the pyloric canal with the thickest and densest part of the carcinoma on the lesser curvature about 2 cm. from pylorus. The duodenal ulcer had healed.

When I reviewed the question in my Hunterian lecture in 1920 I had had three cases in which I had carried out gastro-jejunostomy for chronic gastric ulcer, which died at seven, five, and four years after operation with abdominal malignant disease. All were of the type I now treat by partial gastrectomy. In none was there a post-mortem examination. Since that date no case has occurred, so that I must conclude it is a very rare sequence and one that should not influence us in the treatment of the small free ulcer on the lesser curvature which heals so readily after gastro-jejunostomy.

We must be careful in accepting the presence of a malignant mass in the abdomen after a gastro-jejunostomy as evidence of carcinoma of the stomach or duodenum, or the presence of secondary deposits elsewhere.

I have recently reoperated upon a female patient whose duodenal ulcer I treated by gastro-jejunostomy nearly three years previously. I found carcinoma of the body of the pancreas with secondaries in the liver and spleen. The duodenal ulcer had healed and the anastomosis was perfect. Another unusual case was a male patient of 37, who died of carcinoma of lung one year after gastro-jejunostomy for chronic duodenal ulcer. We were able to obtain a post-mortem and found a thin scar in the duodenum and a perfect gastro-jejunostomy opening. A somewhat similar case was a male of 44, upon whom I carried out partial gastrectomy for a very indurated lesser curve ulcer and a chronic duodenal ulcer. Microscopic examination showed both to be simple. He was readmitted 18 months later with discomfort. He was found to be suffering from carcinoma of his left lung. All three might have been considered as starting in the stomach but for the result of operation in the first, the post-mortem in the second, and the microscopic examination in the third.

I have recently operated upon a case of chronic duodenal ulcer with secondary deposits in the liver from a primary focus in the lung. The case is worth quoting briefly:—

R. M., a male aged 52, was admitted under my care in June, 1925, with a history of almost continuous discomfort after food for nine weeks with vomiting and loss of weight. He was wasted and a definite mass could be felt in the right hypochondrium. His test-meal was 0·28 and 92 and the barium meal showed deformity of duodenal cap. On July 7th I operated, found that the mass I had felt was the liver with a deposit of growth to which the duodenum was adherent. There were several small nodules; I removed one for examination and then found on separating the duodenum that there was a chronic ulcer with a small perforation. I excised it and carried out posterior gastro-jejunostomy. He lost his symptoms and left hospital four weeks later. Microscopic examination of the duodenal ulcer revealed no evidence of malignancy. The deposit from the liver was carcinoma, and it was suggested that the primary was in the lung. I then had the chest X rayed. The report said: "Dense shadow in left hilum. Neoplasm almost certainly."

I have quoted these cases to show that no reliance can be placed on records of carcinoma developing on ulcer after gastro-jejunostomy unless demonstrated at second operation or post-mortem. Moynihan,[57] however, has recorded operating for carcinoma of the stomach 13 years after gastro-jejunostomy for a simple chronic ulcer, the malignant growth being found at its site. This must be a very uncommon occurrence. I can see no reason why carcinoma should develop in a thin scar such as results when a chronic ulcer heals as the result of gastro-jejunostomy, and should look on this solitary case rather as a coincidence. My experience is that carcinoma develops in such a small proportion—certainly less than half of 1 per cent.—of cases treated by gastro-jejunostomy alone that we should not let it influence us, and I am sure I am right in saying that were every case of chronic ulcer to be treated on suspicion as malignant the rise in the immediate death-rate would be far greater than the number of those who might after a lapse of years succumb to carcinoma.

I think it is too often forgotten by physician and patient, and possibly by the surgeon, that gastro-jejunostomy cannot give a new digestive apparatus, but that it can and does, if properly carried out, lead to the healing of the ulcer, prevents its recurrence, and in only a small percentage of cases is it followed by secondary ulceration. But these patients may suffer as other dyspeptics without organic lesions from discomfort after food, and considering this, 90 per cent. of cures without any digestive disturbances is remarkable.

In conclusion, I should like to say as my mature opinion that gastro-jejunostomy is still the most satisfactory treatment for duodenal ulcer and all cases of free gastric ulcer, that its results equal, if they do not excel, those of any other major surgical operation.

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EXPERIMENTAL AND CLINICAL INVESTIGATION OF MERCUROCHROME.

BY A. T. TODD, M.B. EDIN., M.R.C.P. LOND.,
ASSISTANT PHYSICIAN, BRISTOL ROYAL INFIRMARY; DEMONSTRATOR OF PATHOLOGY, BRISTOL UNIVERSITY.

THE following account of an investigation of mercurochrome may be of some interest. The preparation is an antiseptic acting powerfully in weak dilution even in the presence of albumins; it penetrates deeply and, although it contains 24 per cent. of mercury, it is feebly toxic. By several local surgeons, particularly Mr. F. Walters, this substance was found to give excellent results in some cases, but in others, apparently identical, its action was disappointing. It was this variability which suggested the investigation. Mercurochrome is stated to be disodium-dibrom-oxy-mercury-fluorescein. It is freely soluble in water, but in distilled water, which has a faint acidity, it is rapidly broken down, especially when exposed to light. In normal saline which is feebly alkaline it is much more stable and appears to keep indefinitely in the dark. A solution in this solvent six months old was recently tested and no alteration was noted. Four samples have been examined, one from the stock of the Bristol Royal Infirmary, and three others obtained by Mr. A. Taylor, the dispenser. For brevity it may be said that no differences in toxicity or antiseptic activity could be determined.

Action of Mercurochrome on Organisms under Varying Conditions.

Its antiseptic power was determined in the following way. Carefully measured amounts, by pipette, of a 1 per cent. solution in normal saline were added to 50 c.cm. of a standard broth; after mixing 5 c.cm. were measured into sterile tubes, giving ten tubes of a constant dilution. To these tubes were added varying amounts of acid, alkali, emulsion of micro-organism, and normal saline. These additions were made with standard Dreyer pipettes. The series was incubated overnight and notes made of increased turbidity, indicating growth in the conditions present, the next day; then subculture of a fixed amount was made to determine survival.

The action of four different samples in solutions aged up to four weeks, dilutions from 1 in 1000 to 1 in 500,000, was tested against nine strains of *B. coli*, one of *S. aureus*, one *B. pyocyaneus*, and three streptococci. The following acids were tested: phosphoric, sulphuric, hydrochloric, nitric, formic, acetic, and lactic; as, however, no appreciable differences were found between them they require no further discussion. On the alkaline side sodium hydroxide was used.

As the full tabulation of these tests would require considerable space, verbal condensation must be substituted.

Effect on S. aureus.—Dilution 1 in 50,000: growth occurred in acidities from neutrality to pH 6·8–6·5. Survival occurred in this dilution to acidity pH 6·0. Dilution 1 in 100,000: growth to pH 6·0; survival to pH 5·0. Dilution 1 in 200,000: growth to pH 5·6; survival to pH 4·7.

It is seen from the above that the actual acidity of the solution is of more importance than the concentration of the antiseptic. At acidities near to the neutral point the antiseptic is so little powerful that the organism can grow in its presence; a relatively

(*Continued from opposite column.*)

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slight acidity first inhibits growth and another slight increase causes death.

Effect on B. coli.—Great variability was found. The most resistant strain tested behaved as follows. In a dilution of 1 in 10,000 growth occurred at pH between 7·9 to 5·6. Survival occurred between pH 8·7 to 4·8. The variability of the nine strains is shown by the different acidities at which survival occurred; the dilution was 1 in 30,000. Three strains survived in acidities down to pH 6·8; two strains to pH 6·6; two strains to pH 6·0; one strain to pH 4·6; one strain did not survive at neutrality. One of the strains tested was obtained from a patient who had been treated with mercurochrome for some time; this strain was one of the least resistant found; habituation had not reduced toxicity.

Effect on B. pyocyaneus.—At dilution of 1 in 10,000 no survival was found. At 1 in 20,000 survival was found to pH 6·8. At 1 in 30,000 survival to pH 6·5. At 1 in 50,000 survival to pH 6·0.

Effect on S. equinus.—Dilution 1 in 30,000, survival to pH 6·7; dilution 1 in 50,000, survival to pH 6·0; dilution 1 in 100,000, survival to pH 5·2.

Effect on S. ignavus.—Dilution 1 in 30,000, survival to pH 6·8; dilution 1 in 50,000, survival to pH 6·5; dilution 1 in 100,000, survival to pH 6·0.

Another factor which probably leads to variability in the results obtained with this antiseptic was found when experiments were made to determine whether an increase of the infection would lead to alterations in the results. The amount of infection used in all the above experiments was three drops of an emulsion of a standard opacity. Series of tubes containing equal amounts of a constant dilution of mercurochrome at the same acidity were prepared. To these increasing amounts of the emulsion of living organisms were added and the dilution was kept constant by the addition of saline. The result was of interest; in a dilution of 1 in 2000 there was no survival until nine drops of emulsion had been added; if more than nine drops were added survival constantly occurred. In a dilution of 1 in 2500 at the same acidity and using the same emulsion, it was found that only six drops were needed to ensure survival.

The explanation of this diminution of the antiseptic power of mercurochrome in the presence of a more massive infection is not quite clear. It is known that in a given strain of an organism there are units of different vitality, some weakly, others vigorous; by increasing the number of units the chance of there being one of these vigorous ones would be more likely. If this were the explanation the results would not be so constant, every now and then a vigorous unit would be found in the lesser dilutions. The explanation appears to be the protective action of the increased density, caused by increased amount of bacterial protein added. It was found that with a constant dilution of the antiseptic and a constant acidity the antiseptic action of this substance diminished with increased density of the solvent, especially when the increase of density was due to protein.[1] Thus the solution in distilled water was more toxic than that in normal saline, and that in normal saline greater than that in the standard broth. In normal saline mercurochrome, 1 in 10,000 at pH 6·4, a strain of *B. coli* survived for one hour only; in the standard broth the same strain survived overnight.

Comparison of Mercurochrome and Corrosive Sublimate.

The antiseptic properties of $HgCl_2$ were tested in the same way, and it was found that increasing acidity augmented its power. Weight for weight it was found that $HgCl_2$ was more powerful; thus, in a dilution of 1 in 100,000 in nutrient broth, killing power was increased as the acidity increased, but in this dilution and medium mercurochrome was devoid of killing power on *B. coli*. If a comparison be made relative to the mercury-content, however, it is seen that mercurochrome is the more powerful; in mercury-content 1 in 100,000 $HgCl_2$ corresponds to 1 in 32,000 mercurochrome, which dilution has been shown to be strongly antiseptic at relatively low acidities. Mercurochrome has the advantage that it is not precipitated by albumins, and it will be shown that it is considerably less toxic.

Penetrating Power of Mercurochrome.

The rapidity of penetration of mercurochrome has already been proved.[2] The following experiment emphasises the depth of penetration.

A rabbit of about 2 kilos was anæsthetised with ether and after emptying the bladder a 0·5 solution of mercurochrome was injected under the feeblest pressure possible. The catheter was then clipped and the bladder kept full for one hour, after which the animal was allowed to recover from the anæsthetic. Next day it was killed with chloroform. It was found that the bladder was deeply stained throughout, that the peritoneum round the bladder was deeply stained, and a less deep staining tracked upwards along the attachment of the mesentery. The pelves of the kidneys were distinctly stained, although the pressure of the injection had been far too low to force the ureteric valve.

This explains the finding that intra-ureteric injection is not necessary in pyelitis.

Toxicity for Animals.

The toxicity for animals was found to be less than had been reported: 10 mg. per kilo has been given as a lethal dose.[3] Either the difference is due to the solvent used—i.e., normal saline, with better keeping power—or the rabbits in this country are more tolerant. Altogether 24 rabbits were used, and about 130 injections intravenously or intraperitoneally were made. Old and new solutions of the four samples were used, and no differences could be determined between fresh solutions and those up to three weeks old.

In 1 to 2 per cent. solution there appeared to be no signs of toxicity below a dosage of 5 mg. per kilo. When this amount was exceeded diarrhœa appeared and increased with the dose. At 25 mg. per kilo deaths began; at 35 mg. per kilo rather more than 50 per cent. of the animals died, and the survivors were very ill; 50 mg. per kilo was fatal in about one minute. Excretion appears to be mainly through the colon and the kidneys, and is slow; a rabbit which received 7 mg. per kilo daily for four days was very ill, but recovered. Two female rabbits received 175 and 180 mg. each, spread over ten weeks; they both recovered and between them produced four normal litters, one during the course of the injections.

When death occurs rapidly after a large dose it appears to be due to heart failure; the heart is found to be dilated and is in diastole. In the animals dying after several doses the main changes found were a catarrhal colitis and a varying degree of nephritis. The latter did not appear to be proportional to the amount of mercurochrome injected. The nephritis was mainly tubular and desquamative; but in deaths after large doses, hæmorrhages into the glomeruli and interstitial tissue were found. Pronounced fatty degeneration and calcification, the special features of mercurial nephritis, were not noted.

Mercurochrome as a General Antiseptic.

An attempt was made to determine whether mercurochrome had any value as a general antiseptic. From the in vitro experiments recorded above it appeared unlikely that such would be found. At the acidity of the blood its antiseptic activity was found to be so slight that at the concentrations possible in the living animals such an action appeared to be improbable. Rabbits were inoculated intravenously with virulent strains of *B. aertrycke* and *B. coli*; half were kept as controls, the other half received sublethal doses of mercurochrome intravenously at varying intervals after the inoculation. The result was always the same, the animals which received the mercurochrome died before the controls.

Mercurochrome has frequently been injected intravenously in man, mostly for pyelitis, in which the results are fair. In pyelitis it cannot be termed a

general antiseptic; here it is concentrated in the urine during excretion and, if the concentration and the acidity are adequate, a well-marked local antiseptic action will occur.

Therapeutic Uses of Mercurochrome.

Mercurochrome has been used in many ways and in various conditions; there is a fairly large literature, mainly in the American medical press. It is hoped that the findings noted above will give improved results. Whatever condition requires its application it is advised that purulent discharges be removed by lavage and that the solution be rendered feebly acid, preferably by means of acetic acid; the latter should be added drop by drop until the first degree of turbidity appears; this reduces the pH to about 6·2.

Its chief use appears to be in infections of the urinary tract; here it is considerably superior to the usual methods of treatment. Subjective symptoms disappear rapidly, but laboratory cure is more slow. The relief which frequently follows a single injection is striking. The method which I have adopted is the following:—

The bladder is emptied, preferably by catheter, and if there is much pus a preliminary wash with normal saline is given. Then 1 to 2 oz. of mercurochrome is introduced and retained for about one hour, after this time it is voided. An injection is given once or twice weekly, depending on the severity of the case. Occasionally some suprapubic pain is noted; in such a case the mercurochrome can be removed at once, and subsequent injections should be given more diluted. After two weeks to a month the injections may be replaced by sufficient alkali by the mouth to render the urine alkaline. During the time the mercurochrome is being used the urine is kept as strongly acid as possible by means of sodium acid phosphate.

Even in pyelitis the same method is employed; intra-ureteric injection is not necessary. I have been using this method for out-patients, as well as for cases requiring bed.

In four cases of ulcerative colitis lavage with 6 to 8 oz. of a 0·3 per cent. solution gave good results in three; the fourth case appeared to have perforated before his admission to hospital. In one of these cases there was much irritability, and a solution in mucilage of tragacanth was more easily retained. As a superficial application it has been instilled or used as a wet dressing and covered with jaconet; it is very soothing and its penetrating property produces good results. Its injection around septic processes has given some brilliant results; an account is being prepared.[4] I have only used it in this manner around deep whitlows after incision; pain was eased and healing appeared to take place more rapidly than in cases not so treated. It may be found of use in pleural empyema and suppurative peritonitis; in one case of pneumococcal peritonitis I advised its injection, but the patient died. When injected the total amount must not exceed 5 mg. per kilo.

Summary.

1. Mercurochrome is a powerful antiseptic of low toxicity, rapid and deep penetrability, and causes little irritation. It does not precipitate albumins. If protected from light it is stable for long periods in normal saline solution.

2. Its antiseptic properties are augmented by acidity; they are diminished by increased density of solvent and are likely to be less apparent in heavy infections. Various strains of an organism show differences in susceptibility.

3. At acidities near to normality its antiseptic properties are relatively feeble and it is unlikely to be of value in general infections.

I am indebted to Prof. I. Walker Hall for much advice and laboratory facilities. The expenses of this research have been met by a grant from the Colston Research Fund.

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NOVASUROL: A NEW DIURETIC.

BY A. R. GILCHRIST, M.B., CH.B. EDIN.

(From the Department of Therapeutics, Edinburgh University.)

CERTAIN advanced forms of cardiac failure frequently prove refractory to all therapeutic measures, and this is notably the case when digitalis, dieting, and the common diuretics have no effect in removing the œdema. Therefore, any drug which could be relied upon to invoke a profuse diuresis, relieving the overburdened ventricle, would be assured of a permanent place in therapeutics.

Novasurol was originally introduced by the Bayer Company as an organic compound of mercury for the treatment of syphilis, its composition being sodium-oxymercuric-ortho-chlorphenol oxylacetate with dimethyl malonylurea. Later its diuretic properties were noted by Saxl and Heilig.[1] The drug is put up in sterile ampoules and is administered in doses of 1–2 c.cm. by intramuscular or intravenous injection, each c.cm. containing 0·1 g. of the drug. As a test of its capabilities we have employed the drug in several cases of advanced cardiac failure where the response to digitalis, the diuretics in common use, and the usual therapeutic measures was unsatisfactory—in fact, where the patient's clinical state was virtually at a standstill. As a means of comparing its effects the drug has also been administered to certain other cases. Records of ventricular rate, 24 hours' volume of urine, weight, and vital capacity (V.C.) have been kept throughout treatment—the fluid intake was kept approximately constant. The dose employed was generally 1 c.cm. injected into some œdema-free area, either the buttock or back. Subcutaneous injection must be avoided, as the drug acts as an intense local irritant.

Clinical Records.

A few clinical examples of its use and effects may be recorded:—

CASE 1.—Mrs. J. A., aged 43, was an in-patient from Feb. 15th to April 23rd, 1924. She was admitted in an advanced stage of failure, which responded well to digitalis and the usual measures. The diagnosis was mitral stenosis with auricular fibrillation. Quinidine restored the normal rhythm which persisted until she was readmitted on May 21st, 1925, with failure more advanced than before, and accompanied by a secondary anæmia. Digitalis slowed the heart without benefit to her general condition, the œdema increased, and the urine output fell to 900 c.cm. Diuretin and pot. acetate were employed without effect. Novasurol was then tried with excellent results. It was necessary to employ the drug on seven occasions, and on the days following its use her urine amounted to 1800, 3300, 3000, 1800, 3300, 2400, and 3900 c.cm. She lost 17¼ lb. in weight. This was accompanied by marked clinical improvement, and she was discharged in good health on August 8th, 1925. This case is shown graphically (see figure).

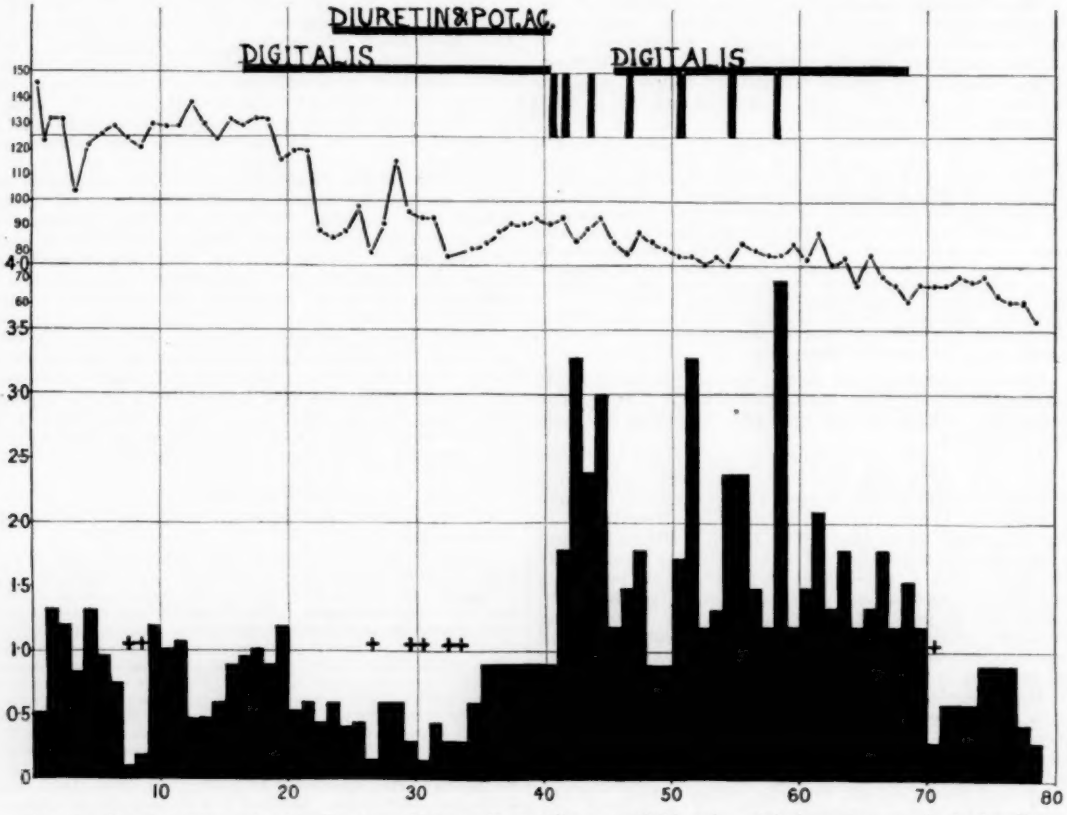
CASE 2.—J. P., aged 25, suffered from mitral and aortic regurgitation with auricular fibrillation. There was much ascites present, ventricular rate 120, V.C. 55 per cent., and urinary output measured 1000 c.cm. Digitalis produced some improvement (V.C. = 75 per cent.), but a certain amount of ascites persisted. He now received four injections of novasurol at intervals after massive doses of digitalis. His urine measured 2280, 3300, 4080, and 1200 c.cm. The V.C. now rose to 97 per cent. Having lost 17 lb. in weight, he was discharged on April 9th, 1925. He was readmitted with similar symptoms on the 28th, and novasurol was repeated without previous digitalisation. Urine output increased from 750 c.cm. to 2400 and 3300 following two doses, and the heart rate fell from 120 to 66 in 24 hours. The œdema and ascites disappeared. Digitalis was now employed and his condition improved steadily. On discharge his V.C. was 89·4 per cent., weight lost = 14¼ lb., and heart rate = 80.

CASE 3.—A. S., aged 29, suffering from advanced failure due to mitral and aortic disease with auricular fibrillation. Digitalis and diuretin were employed with some benefit, but the œdema and ascites persisted. Novasurol was now employed. The first three doses had little effect, but the fourth, given when fully digitalised, raised his urine output

from 960 to 4050 c.cm. on the following day. Steady improvement now set in, his V.C. rising from 32·5 per cent. to 65·5. He lost 54 lb. in weight and was discharged on April 26th, 1925. He was readmitted on July 31st with similar symptoms. The same lines of treatment were carried out, and novasurol provoked diuresis of 2300, 2880, 2320, 1800, 2280, and 2760 c.cm., whereas digitalis alone was relatively ineffective. He was discharged on Oct. 14th, having lost 41 lb. in weight, and with a V.C. of 61·4 per cent.

CASE 4.—Mrs. E. N., aged 50, was a patient from Jan. 9th, 1925, until her death on April 24th. She suffered from advanced cardiac failure, secondary to chronic bronchitis and emphysema of 10 years' duration. There was great œdema extending from the feet to the back, and much ascites. Her urine averaged 600 c.cm. for the first ten days in bed. Heart was regular (V.C. = 28·4 per cent.). Digitalis, diuretin, urea, repeated doses of calomel, theocin, and caffeine were all tried without benefit. Novasurol had little or no effect.

CASE 5.—Mrs. M. A., aged 52, gave a history of five attacks of rheumatic fever. The heart rate was 150, regular, and a diagnosis of mitral and tricuspid incompetence was made. There was ascites, and generalised œdema was present, which reached enormous proportions in the legs. Urine output average = 600–900 c.cm., and V.C. was 28 per cent. A massive dose of digitalis slowed the heart, but did not relieve her condition, and urine remained as before. Novasurol induced a diuresis of 2160 c.cm., but improvement was not maintained, and further repeated injections with and without simultaneous administration of digitalis were ineffective. Diuretin, theocin, repeated doses of calomel, Guy's pill, &c., were without avail, and she died on July 14th, 1925.



Case 1.—Showing urine output in litres per 24 hours (larger figures at left) and ventricular rate per minute (smaller figures at left). The + sign indicates that a portion of the 24 hours' sample of urine was lost on that day. The time during which digitalis, diuretin, and potassium acetate were administered is indicated by the horizontal lines; each injection of novasurol (1·0 c.cm.) is represented by a vertical line. The lower figures indicate days in the ward.

Commentary.

Of the five cases now reported two failed to respond satisfactorily to the drug. In one, Case 4, diuresis was not produced, and in the other, Case 5, although temporary improvement set in after its use, this was not maintained. Those that responded suffered from auricular fibrillation. In Case 4 the myocardial failure was secondary to long-standing pulmonary trouble, and it is unlikely that any drug could overcome the mechanical causes of the cardiac failure here present. Drugs can only alleviate cardiac failure in so far as the myocardium is able to avail itself of the help offered. In Case 5 the failure to respond to the preliminary diuresis induced by novasurol must be attributed to the fact that the heart muscle was so damaged that its activity bore no relationship to the bodily needs. In both these cases the ventricle was completely exhausted. Further experience will teach how to select those cases which will be able to benefit by the use of the drug, but it is noteworthy that in both unsuccessful cases the vital capacity was reduced to less than 30 per cent. (calculated on West's standards).[2] Peabody's researches [3] have shown the value of vital capacity in following the course of cardiac disease and as a guide to treatment. Both cases also suffered from intense venous engorgement, and in Case 5 the venous blood pressure (Young's method[4]) reached 28 cm. of blood, the normal value being about 10–14 cm. by this method. In Case 1 the results were dramatic; here digitalis and diuretin were of no value, and improvement set in as soon as diuresis lessened the ventricular burden. Cases 2 and 3 also demonstrate conclusively the drug's value, and, as would be expected, the diuresis produced is greater when the patient is fully digitalised. It bears a resemblance to Guy's pill in this respect. The urine output also depends upon the amount of tissue fluids present on which the drug may act.

Novasurol, therefore, appears to be a most suitable adjuvant to digitalis therapy, and is apparently more reliable and more potent than any other diuretic at

present in use. Pisani[5] has recorded five cases in which the drug was effective when other remedies, such as theocin, digitalis, and strophanthin, had failed. Oerting[6] had five successful cases out of a total of ten, and in Crawford and McIntosh's series[7] two of eight cases were unsuccessful. Most authorities agree that owing to the presence of mercury in the drug renal disease is a contra-indication to its use. Keith, Barrier, and Whelan[8] have, however, recently reported 12 cases of nephritis successfully treated with ammonium chloride and novasurol. This appears to open up an increased field of usefulness for the drug.

Conclusions.

1. Novasurol is a diuretic of great value in cardiac failure. It appears to be of greater potency and certainty than any of the other diuretics in common use.

2. When employed with digitalis each enhances the other's action.

3. It is suggested that cases which do not respond to the drug have a very low vital capacity, and it is unlikely that any diuretin would be helpful to such hearts.

My thanks are due to Prof. Murray Lyon for placing these cases at my disposal, and for his helpful criticism and advice in connexion with this work.

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Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF SURGERY.

A MEETING of this Section was held on Nov. 4th, Sir LENTHAL CHEATLE, the President, in the chair.

Dr. J. H. SEQUEIRA opened a discussion on

PRE-CANCEROUS STATES.

He said that the skin aspects of these states deserved more attention than had hitherto been given to them. A pre-cancerous state was hard to define; there were all degrees of susceptibility. Some skin conditions very frequently became cancerous, others but occasionally. The time factor might be the determining one. At any rate, it could be said that there were certain conditions which were potential cancers. For convenience he divided these into congenital and acquired. All conditions of hyperkeratosis, pigmentation, and warty formation were peculiarly liable to malignant change. He illustrated his points by a series of photographs. Xeroderma pigmentosa was a congenital anomaly running in families, a kind of juvenile senility of the skin wherein young children showed all the changes associated with prolonged exposure and might even have definite carcinomata. Occasionally the same condition was seen in the adult. Unna had described a "seaman's skin-cancer" which was the result of any exposure, on sea or on land. The new growths, whether squamous-celled (epithelioma) or basal-celled (rodent ulcer), rarely developed wide malignancy unless they were in the region of the angle of the mouth. To be compared with these conditions was the well-known X ray cancer appearing on the very thin, atrophic, vulnerable, pigmented, and warty skin resulting from repeated short applications or, rarely, from one bad burn. Since the introduction of X ray treatment for lupus the percentage of carcinomata appearing on old lupus sites (formerly 2 per cent.) had greatly increased. Tar and creosote cancers were similar conditions which followed the burning off of the small warts that the workers developed in handling the irritants. The arsenical treatment of psoriasis exposed patients to small doses of the drug over many years and the skin took on an appearance very like congenital keratosis, with a characteristic "raindrop" appearance of the pigmentation. Other forms of chronic irritation that he had found resulting in cancer were the prolonged wearing of a cheap wedding ring and the constant use of a hot poker by a baker. He showed photographs of a case of multiple rodent ulcers on the forearm. The patches had been diagnosed as psoriasis, but histologically they showed a transitional condition of pre-cancerous dermatosis, some of the cells being squamous and some basal. He asked whether surgeons now attached any importance to "dyskeratosis."

The PRESIDENT divided his cases into two classes: the desquamative hyperplasia, which was desquamative only; and the dysgenetic epithelial hyperplasia, which led to tumour formation. Normal epithelial overgrowth, as in the covering of a wound, might be called "genetic epithelial hyperplasia." By "carcinoma" he understood a dysgenetic epithelial hyperplasia associated with invasion of surrounding connective tissue and metastasis. Clearly, such a condition must at first be limited to normal boundaries, and therefore there must be such a thing as a "pre-cancerous state." His definition did not admit the presence of carcinoma unless there were invasion and metastasis; to this there were, of course, a few exceptions, such as rodent ulcer, and there could no doubt be a condition of malignancy or potential malignancy without metastasis. The changes occurring in the breast were, in sequence, a dysgenetic epithelial hyperplasia (sometimes called "chronic mastitis") with a lymphocytosis beneath the skin, warts, papillomata, and then a tremendous hyperplasia of very malignant-looking cells. All these changes were within the limits of the normal, but transplantation of these cells under the skin of another part of the same animal resulted in their growth and malignant metastasis, but transplantation of tar-warts only resulted in atrophy of the transplant or the formation of non-malignant cysts. He thought that these warts were not in themselves malignant, but certainly a source of danger. The lining of the papillomata, however, could certainly become malignant. It was impossible to say in any given case whether or not malignancy was likely to supervene.

Mr. W. SAMPSON HANDLEY said that the essential factor in the pre-cancerous condition was the connective tissue change. Epithelium could not nourish itself properly from the body-fluids; it depended on the connective tissues for nutrition; it might be described as an obligate parasite on connective tissue. It could not grow by itself, but would grow if connective tissue were added to it. Carcinoma began with long-standing inflammatory changes in connective tissue; 20 or 30 years might elapse between the lupus, or the tar irritation and the cancer resulting, which was preceded by a collection of lymphocytes and plasma cells beneath the epithelium. He showed photographs illustrating the permeation of lymphatics and proliferation of the epithelium; a lymphangitis was always present in cancer, lupus, and syphilis. If the ducts were blocked there would be auto-intoxication; possibly this might bear some relation to the "third factor" of Dr. W. E. Gye. In the diagnosis of early breast cancer a valuable sign was deviation of the nipple. If there was deviation in a supposed case of chronic mastitis it should arouse the gravest suspicion.

Mr. ZACHARY COPE regarded pre-cancerous states as essentially a medical condition. He reviewed the examples encountered in the alimentary tract. In the mouth there were three conditions: (1) Leuco-

plakia; this should be removed if it did not disappear under medical treatment. (2) Papilloma of the tongue, which should always be excised. (3) Dental ulcer; this was always a potential cancer, and should be treated as such if it did not subside rapidly under medical treatment. No pre-cancerous condition could be distinguished in the œsophagus. In the stomach the relationship of gastric carcinoma to gastric ulcer had received much attention with very varying results. Figures had ranged from 75 to 5 per cent., and now there seemed little evidence that a simple ulcer ever ended in carcinoma. Valuable statistics could be obtained if surgeons would investigate the after-histories of perforated ulcers on which they had operated. In the small intestine carcinomata were rare; the papillomata were to be regarded as pre-cancerous, as they were also in the urinary tract. In the large bowel multiple papillomata were certainly pre-cancerous, but there seemed no connexion between cancer and such forms of ulceration as typhoid, except that any form of toxæmia might predispose.

Dr. E. SHAW had no doubt of the existence of a pre-cancerous state. The two main conditions to be considered under the term were chronic inflammations and simple new growths. In chronic inflammation of the breast the changes were many and varied; the epithelium of the acini underwent various alterations of form and arrangement, and might proliferate and project into the cystic acini, but were always surrounded and attached to a thin fibrous basement membrane in simple conditions; if there were clumps of epithelial cells lying loosely in the cavities carcinoma had set in. In his opinion a breast affected with chronic inflammation was in a pre-cancerous state, as also were many skin and mucous papillomata showing invasion of the deeper tissues by superficial cells. In the cervix evidence of development of carcinoma on chronic inflammation was provided by the transition from squamous to columnar and the appearance of definitely malignant groups of squamous cells deep in the muscle. Leukoplakia provided another example. He pleaded for a more intensive study of the morbid anatomy of cancer.

Dr. R. M. LIVINGSTONE described attempts to find some difference between true pre-cancerous conditions and similar appearances that were not pre-cancerous. A chemical contrast between acute and chronic inflammation had been determined. The reaction of the tissues in chronic inflammations was invariably acid, while in acute inflammations it was alkaline. Pyogenic micro-organisms at work produced acid which was oxidised by the action of the tissues in acute conditions. It might be that this acid secretion rendered tissues more vulnerable to cancer. Dr. Gye's work bore out this hypothesis. The chemical conditions of the medium which Dr. Gye had found favourable to growth corresponded with the conditions which occur in chronically inflamed tissues. In the alimentary canal fermentation and putrefaction produced similar substances to the putrefiable sugars used by Dr. Gye for culture.

Mr. J. E. ADAMS described a case of chronic mastitis for which the breast had been removed five years previously; the patient recently returned with cancer in the other breast. Chronic mastitis had been regarded as a pre-cancerous condition, but he and Mr. Halliwell had followed up 135 cases of chronic mastitis where the breast had been removed, and in only four or five cases had cancer developed. It was very hard to find any clinical connexion between the pre-cancerous conditions and carcinoma. Obviously any condition that upset the cellular balance might be regarded as pre-cancerous.

Mr. LOCKHART-MUMMERY said that the commonest precursor of cancer in the large bowel was the simple adenoma, which constituted 80 to 90 per cent. of all the growths met with there. It was possible, however, that other growths might result in carcinoma. It was possible to have two or three carcinomata in the same intestine at the same time, not necessarily as a result of grafting. He had known two cases of carcinoma supervening on diverticulitis, but both were peculiar in that they had perforated.

Mr. D. C. L. FITZWILLIAMS said that the process of cancer formation in the breast was that for some unknown reason the epithelium became active; when it had transgressed the normal limits of proliferation it might be called pre-cancerous. If it disappeared altogether the result was a cyst and no cancer; if it remained the condition was suspicious. If the ducts were dilated the cancerous cells would escape into the tissues. If a wart appeared it would become carcinomatous in about 12 months. When the basement membrane had been penetrated cancer appeared. The undoubted influence of long chronic irritations seemed to indicate that direct bacterial action was not the cause of cancer. There had been practically no advance made in this subject since Boerhaave first suggested that cancer was the result of chronic irritation.

Dr. E. HAYDON asked whether tuberculosis disposed to cancer, quoting cases from his practice in Devonshire, where there seemed to be a special hereditary disposition to cancer, as cases were very frequent.

Dr. CARNEGIE DICKSON said that the pathologist was faced with the most difficult task of setting the margin of malignancy. Many simple tumours could become malignant. In 90 per cent. of cases of chronic hypertrophic endometritis, for instance, the epithelial cells were passing the basement membrane, but not all of them were definitely malignant. He thought frozen sections in the operating theatre were liable to mislead, as a tumour might vary so much in appearance in different parts. It was easy to think there was malignancy when it was not present; metastasis was not necessary for the diagnosis. He regarded myeloma as malignant, although it was often classed among the simple tumours; it certainly had local malignancy. He also regarded rodent ulcer as malignant.

The PRESIDENT, in replying, said that Mr. Fitzwilliams went much too far in saying that cancer was not due to bacteria. Recent experiments had shown that mice could be rendered immune by injection of the ultra-microscopic virus.

Dr. W. NEWCOMB demonstrated illustrative slides, with particular reference to gastric ulcer and carcinoma. A proof of the previous existence of an ulcer was the fusion of the muscularis mucosæ with the triated muscle of the stomach wall.

HUNTERIAN SOCIETY.

A MEETING of this Society was held on Nov. 9th, Dr. F. H. HUMPHRIS, the President, in the chair, when the Bishop of KENSINGTON opened a discussion on the

Relation of Spiritual Healing to Modern Medicine.

To many people, said Dr. Maud, spiritual healing suggested necromancy and magic—something not quite canny—especially if the practitioner held the office of, for example, a bishop. The term spiritual healing was hard to define. It had become so confused and meant something different to everyone who used it. It would, however, be hard to give a clearer definition than that put forward by the Lambeth conference. They found that healing was divided into three avenues: the material, which included surgery, the use of drugs and diet, &c.; the psychic, which included analysis, suggestion, and hypnotism; and the devotional, which included prayer, the Sacraments, and reliance on God. Spiritual healing could not be confined to the devotional avenue. All healing was spiritual, and the only unspiritual healing was that which is performed without God. From this point of view he considered the work of the Hunterian Society as emphatically spiritual. Anyone who put his soul into touch with God was by that act alone exercising spiritual power. Unfortunately many people had

tended to interpret the term "spiritual healing" as a method directly opposed to physical medicine. It was as unscientific to exclude the physical side as to exclude the mental, for man is composed of body, mind, and spirit. The proper use of faith healing was to use a man's belief in God to reinforce the powers of his body and mind and make him every whit whole. Healing was not simply the removal of physical ailments nor even of faults of character, but the harmonising of a man's whole personality; this was the real health and this was what was meant by holiness. It was disastrous to regard a man as healthy because he had a sound body; to omit the spirit was to omit the decisive factor. The object of the Church was to bring about coöperation between all the means whereby a man could achieve holiness. Methods could not be kept in water-tight compartments. Many people thought that spiritual healing was a matter of faith or suggestion, a department entirely by itself. It was the Church's duty to use all the methods and means given to us and to spiritualise what might so easily become materialised. Much harm was done by the popular feeling that to send for a man's spiritual adviser was an immediate preliminary to sending for the undertaker, and for this reason doctors often deprecated the advent of the parson. It was true that the office for the Visitation of the Sick dated back many hundreds of years and reflected the mind of that period—to a large extent still the mind of to-day—that all illness was the will of God and should be accepted meekly. This attitude contrasted strongly with that of the doctor, whose job was to fight disease to a finish and conquer it. The Church's business was the same, and ought always to have been so. The attitude of Christ was that any form of ill was essentially contrary to the will of God. God's will was health: "I am come that they might have life . . . more abundantly." It was because the Church had not upheld the Christian doctrine in this respect that it had put itself out of court. There was at the present time every reason to hope that the misconceptions which had separated the two professions could be cleared away, and that the help which the Church ought to be able to give in this matter was just what the medical profession would welcome. If we could change people's minds, external things would soon change too. The process was not one of auto-suggestion, depending on one limited personality, but a linking-up with the mind of God. Prayer for the sick was not simply petition. It was getting up to the mind of God and letting the minds of the congregation reflect the thought of the mind of God for the sufferer.

Dr. F. G. CROOKSHANK said there seemed to be an urgent need for definition of terms, but that the patron of the Hunterian Society had said that of all things definitions were most to be condemned. We all knew what we meant by the relation between spiritual healing and modern medicine, but we seldom knew what other people meant by it. We needed to think about it, but unfortunately again the great Hunter had exclaimed, "Don't think; try!" The medical profession had been trying hard for many years not to think, with a very fair measure of success. In a way they were right; thinking might lead to a loss of that self-confidence which was so essential a factor in gaining the confidence of others. The general attitude of the medical profession to spiritual healing was something like: "Oh, well, it's all a matter of suggestion, if it's true at all, and any case that was cured by anybody but a doctor must either have been a functional disease or else it wasn't cured, one or the other. Of course, a functional case isn't worth bothering about unless it's rich, and then you consider what operation you might do, or else give it some bromide. As for all this curing by prayer, it ought to be stopped, and it will be when we get a decent authority at the Ministry of Health who will do what the B.M.A. tells him to." Which attitude was very satisfactory to those who held it, but if we wanted to advance the matter we must be very careful not to mistake words for ideas and interpretations for facts. What we took for observed facts were too commonly interpretations. Medical prejudices were never more dangerous than when they dwelt in the minds of doctors who said they had no prejudices. So long as doctors derived their working principles from the dreary agnosticism of the last century, which said that although the physical could and did determine the psychical, the psychical could never affect the physical, so long must there be an unbridgeable gulf between them and the theologians. So long as we believed that mind is a function of matter, so long should we deny that spiritual treatment could affect the physical condition and maintain that spiritual cures were either fancy cures of real disease or real cures of fancied disease. But the psycho-analysts had shown that states of mind must be held responsible for many organic conditions, and it was not good enough to dismiss spiritual healing as phantasy, suggestion, or emotion. Some thought this disposed of the problem, but actually it only made it more difficult. The Huxley-Spencer metaphysics had resulted in a neglect of functional disease by the medical profession; it was a curious thing that this should have been remedied and liaison made possible by the psycho-analytic school, so hated by the theologians. What was hindering reconciliation was that the theologians did not adopt any clear metaphysical creed. It would be helpful if the Protestant churches would define what they postulated as the relation between mind and matter. For his part Dr. Crookshank recognised the truth of the old French physician, "Le médecin fait ce qu'il peut, mais le Dieu seul connait l'humanité." There was no reason why the cure of organic disease, however defined, should not follow prayer and spiritual healing, however defined. There was need to clear away the bogy of distinction between functional and organic disease and between physical and psychical therapeutics. Objectively they were indistinguishable. In the most functional disorders of all there was room for organic changes not yet visible to us. Organic disease might be defined as what we say we can cure and functional disease as what the quacks cure and we wish we could. The surgeons said that the physician's nasty drugs acted by suggestion; why should not the physician say that the surgeon's sanguinary operations acted in the same way? Prejudice and verbal lumber should be set aside to make clear what really does happen. The medical profession had no right to regard the business of healing as their prerogative; their function was to rationalise the business of healing for the benefit of the community. All creatures had the power of reparation, from an amœba to an archbishop, and we called that power the *vis medicatrix naturæ*. A belief in miracles was essential to the doctor's art. The miracle of healing represented the manifestation in ourselves and for others of that power possessed by all creatures for themselves. Why should not some people possess this power in an excessive degree and be able to bring it into consciousness? Were there not human beings who possessed power to heal others in a way that could not be rationalised? The power was exceptional, of course, and comparable with the musical genius of an untaught child. Why did the dog and cat seek a special grass when they were unwell? Cases of spiritual healing might be divided into two groups. In the first there was direct relationship with an objective personality, enriched with more or less ritual and appeal. Successes obtained were unsubstantial unless there was a simplicity of character and strength of personality behind the ritual. The instrument was usually one who had undergone the mystic experience, which was more common than was believed by those who had not had it. Healing was only obtained when the natural powers were released, whether this were in the Harley-street consulting-room or the revival tent. Quite essential was a certain sense of need and helplessness and dependency on a higher power. Dictation of treatment was a bar to conversion or cure. In the second group were those healed by such means as prayer, shrines, waters, &c.; these were mostly functional

cases. Spiritual healing was a function of the religious experience in one form or another; there was no justification for holding it to be the monopoly of one creed or one form of practice. It was a curious and interesting fact that although neuroses were very common among Jews, yet faith-healing made no appeal to them, and even the Jewish exponents of psycho-analysis based their theories on purely material grounds. On the other hand, the standard of health was nowhere so high as among the Quakers, who were mystics, and the Plymouth Brethren, who believed profoundly in spiritual healing. The scope of psychotherapy was co-terminous with the whole range of disease, though never to the exclusion of physical remedies. Spiritual methods could be used to mobilise or release that innate capacity of reparation possessed by all, but so often restrained by mental rigidity. Dr. Crookshank was astonished that the theologians did not realise more the strength of their position.

The Rev. HAROLD ANSON said that it was important for the clergy and doctors to define spiritual healing; it meant the healing of the whole man, body, soul, and spirit, by all those methods which are according to the will of God or sound logic. In the future it would be quite impossible to heal people in departments. He had been trying for many years to act on this doctrine, and his clerical friends seemed to regard him, until recently, as a dangerous lunatic and the doctors as a criminal. In a neighbourhood full of misery resulting from tuberculosis, venereal disease, and alcohol it was highly unsatisfactory to build a big hospital where the symptoms of these conditions were cured and the patients sent back to the same surroundings and the same misunderstandings. The scientific way of healing was to remedy the unsatisfactory spiritual condition which had produced these diseases—the community's ignorance of what life really is. There was a type of spiritual healing which really tried to get at the underlying wrong thought. Even organic cases could be cleared up by inquiring into and treating home difficulties and distresses.

Canon DOUGLAS said that he had had no experience of supersession of natural law. Spiritual healing was coöperation with God to remove an evil. He pointed out that prayer was a concentration on need rather than an uttered petition; it was only valid if backed by the whole human purpose. It was not auto-suggestion nor reliance on some outside power. Spiritual healing was the result of man's efforts with God's coöperation. He had known a case of instantaneous healing in his own experience, but did not regard these events as important; the work of the parson was to get people to concentrate their minds.

Dr. M. LEAHY said that he saw no reason for any conflict between the clergy and the doctors. The ills to be healed were of three kinds—bodily, mental, and spiritual—and all three could act and react on each other. Modern medicine was concerned with body and mind; it had nothing to do with eternal salvation, but doctors were nevertheless often asked for advice by patients racked by spiritual doubts. These cases were best left to the spiritual adviser unless their doubts were producing mental disorder. Cases of religious mania and melancholia were better in the hands of doctors. There were two lines of treatment, surgical and medical, and the latter was again divisible into physical and mental. Spiritual healing certainly could not cure gross surgical injuries, acute conditions, or infections by bacteria. The spiritual healer cured by appealing to the mind of the patient, by asking the patient to put his trust in God; why should not the mind be given the credit for the cure? Belief in God and the hereafter was undoubtedly good for man, but an appeal in such terms did not always cure. The cure, when it occurred, was mental; why insist on spiritual intervention? Belief was a mental attitude. He illustrated the mental cure by three cases, one of organic nerve lesion, one of functional paralysis, and one of spiritual doubt. The Primate had set up a permanent committee of six psychotherapists and six clergymen to be advisers to the Church about all such questions as spiritual healing, healing missions, moral obsessions, &c., and there was every reason to hope that an extraordinarily useful phase of coöperation lay before us, particularly in asylums, prisons, and infirmaries. Dr. Leahy had been astonished to find how few asylum chaplains or their medical officers considered that helping the patients was part of their work.

Dr. EDWIN ASH said that his considerable experience of psycho-therapeutic measures and his observation of spiritual methods had led him to the conclusion that there must be a focusing point of the influences at work, a centre of action of all these healing measures, and that point was the neurone. The weak point in modern psychotherapy was its forgetfulness of the neurone. There must be some point of fusion or reaction between mind and matter. It was the neurone; the nerve cell was like a condenser tuned to respond to the influences of mind. In spiritual healing we had a way of activating the neurone, by some means not yet understood, through the subconscious mind. If it would react to activities at the periphery surely it must be expected to respond to the higher psychic processes. Spiritual healing should not be concerned with medical matters, such as diet, hygiene, or manipulation. Certain kinds of approach, such as prayer, led to a general improvement in the patient's health rather than to specific healing. The cures would be found eventually to be wrought by natural law on natural mechanisms. Ignorant talk of spiritual healing tended to show its relation to medicine in a false light.

Mr. MORTIMER WOOLF said that the ideas of spiritual healing and coöperation had grave dangers; it was a form of atavism to the days when patients looked, and were encouraged to look, to hopelessly ineffective methods for salvation. He asked whether these views were going to influence the public to think that their diseases could be cured by spiritual means and to avoid the practical necessities of modern medicine. If the clergy wanted to coöperate with the doctors they ought to have the same knowledge of fundamental biological processes that the latter won by long years of probation and study.

Dr. LANGDON BROWN, in proposing a vote of thanks to the Bishop, said that the day of neglect of functional disease was now gone; the modern doctor knew that when a patient said he was ill when he was not ill he must really be very ill indeed. There was much misery abroad in the world just now, but it was due to a severe attack of growing pains. The hope of the human race lay in the third stage of growth—not physical nor mental, but psychological evolution.

ASSURANCE MEDICAL SOCIETY.

A MEETING of this society was held on Nov. 4th at the house of the Medical Society of London, Chandos-street, W., when Dr. G. G. HOWITT presided, and Dr. S. VERE PEARSON read a paper on the

End-Results of Artificial Pneumothorax.

The method, he said, was by no means a "cure all" for pulmonary tuberculosis, but it was none the less a great advance in treatment. Patients should be given a chance first to recover under ordinary sanatorium régime, and the cases he would quote were only those which had been given that chance and had failed to respond. All of them had been in the third stage of the disease and had had tubercle bacilli in the sputum. Of 67 patients treated with complete artificial pneumothorax at Mundesley Sanatorium between 1910 and 1922, 26 were now well and working, 35 were dead, several were untraceable, and two were ill with pulmonary tuberculosis. Nine further cases had had their treatment started elsewhere, and four of these were well and the others dead. Of 17 cases of partial pneumothorax eight

were now dead and four were well. The average length of life of the 48 patients who had died was 2¼ years.

Fourteen cases in which pneumothorax was proposed, but was found to be impossible owing to adhesions, might reasonably be compared with the ones treated. Of these 14, 64 per cent. were dead, whereas only 51 per cent. of 77 complete artificial pneumothorax cases had died. Similar encouraging results, obtained with a larger number of patients, could be found in Dr. J. Gravesen's recent work, "The Surgical Treatment of Pulmonary Tuberculosis," and considering all things it was satisfactory that 32 per cent. of pneumothorax patients from Vejlefjord were still able to work 2 to 12 years after discharge, and that 39 per cent. of those from Mundesley were still able to work 3 to 15 years after starting treatment. Such figures compared favourably with those for general treatment. It would hardly be too much to say that in any case of moderately advanced pulmonary tuberculosis which was fairly unilateral the prognosis was best if artificial pneumothorax was undertaken and proved feasible. Re-establishment of full working capacity could hardly be expected during the first few years; rapid complete recovery was most likely to occur in young patients with sound contra-lateral lungs. The pneumothorax ought to be maintained for at least three years—and often as much as five—and the refills had to be done, on the average, every six weeks; but this did not, as was often imagined, mean invalidism for the patient. The average period for refills in his own patients who had made good recoveries was four years and four months.

Discussion.

Dr. L. S. T. BURRELL said that the treatment was too new for any well-defined conclusions to be drawn. From the assurance point of view any case that had had active pulmonary tuberculosis was a bad case, but probably those in which artificial pneumothorax had been done were the most hopeful. Considerable study of post-mortem findings had convinced him that the lung on the side treated tended to heal, whatever might be the fate of the other. Whilst he was far from suggesting that the treatment was contra-indicated in bilateral phthisis, he thought it hardly fair to condemn a unilateral procedure because it did not cure both sides, and it seemed reasonable to judge its therapeutic success or failure from its effects on cases in which, as far as could be ascertained, only one lung was diseased. In 1922 he had published results of a series of 43 such cases in which T.B. had been present in the sputum, and two or three months' ordinary treatment in bed had failed. Of these 43 he had described 27 as "arrested," and now, three or four years later, he had found that 24 could still be called arrested and only two had died.

Dr. BATTY SHAW said that the experience of the two previous speakers made their opinions very important. Unfortunately, the insurance companies demanded exact figures; they wanted to know what were the mortality statistics of patients with an artificial pneumothorax compared with those of healthy people of the same age. Till such statistics could be collected a case of pulmonary tuberculosis would have to be regarded as such regardless of whether it had a pneumothorax or not.

Dr. F. G. CHANDLER said that if a proposer for life assurance had had artificial pneumothorax treatment which had been completed and the lung had expanded again, the assessment of the risk would be the same as in any case of arrested tuberculosis and would depend on the extent of the disease, the general condition of the subject, the ability to undertake full work, the functional efficiency of the lungs, the environment, the intelligence, the length of time since the apparent complete arrest and since tubercle bacilli were last found, the presence or absence of physical signs, the family history, and the complete absence of any suspicious symptoms. Whether the arrest had come about by natural means or by artificial pneumothorax made no difference from the life assurance point of view. If the proposer was still undergoing the treatment, the loading must necessarily be heavy, with later reconsideration, for however well the individual might be there were risks. It was well known that men might do manual work or women bear children, but it was necessary to remember the risk of pleurisy which may possibly interfere with the treatment, the risk that when the lung is allowed to re-expand the disease may awaken into a renewed activity, the risk that the treatment may be abandoned, and the remote risk of a spontaneous pneumothorax. It was interesting to note that nothing had been said of artificial pneumothorax as an immediate measure as soon as the diagnosis of pulmonary tuberculosis was made, and he strongly believed that the early case should always be given a chance of responding to ordinary treatment.

Mr. F. SHERIFF said that pneumothorax provided a new problem in medico-actuarial practice. The question was: Could a life office offer better terms in the cases treated? Unless the life could be considered an average one it would be unwise to accept such a case, except possibly after the lapse of several years if the general condition and other factors were perfectly satisfactory. Probably the best solution was to impose a decreasing debt extending over a period of 10 or 15 years according to circumstances.

Dr. BASIL PRICE said that in weighing up the end-results it was desirable to differentiate between those patients in whom the measure was attempted with the idea of arresting the disease and those in whom it was hoped merely to prolong life. In patients of the latter group there were, however, some remarkable recoveries. He illustrated the difference in prognosis in the two types of case by referring to a series of results obtained by Dr. Alexander Snowden. Of 27 cases in which artificial pneumothorax was done to prolong life only ten remained alive after two years, but of eight in which it was done in the hope of arresting the disease all but one survived over the same period.

The CHAIRMAN said that the information collected was a useful beginning. It was important to know the facts about the treatment because more and more cases would be coming up for assurance.

Dr. VERE PEARSON, replying, said that Dr. Burrell's statistics suggested that the majority of those patients who survived three or four years after having an artificial pneumothorax would still be alive after another three or four years. The percentage of cases in which pneumothorax had to be abandoned on account of complications was very small indeed.

AN ORTHOPÆDIC HOSPITAL SCHOOL.—A conference of representatives of local authorities and other organisations concerned has been held at Nottingham to consider the desirability of providing an orthopædic hospital school for the counties of Nottingham, Leicester, and Lincoln. The Duke of Portland has offered a site of 15 or 20 acres, between Nottingham and Mansfield, and the conference has appointed a committee to inquire into the cost of erecting such a school and the extent of the support likely to be given.

MR. W. B. COSENS AND THE DORSET COUNTY HOSPITAL.—Mr. W. B. Cosens, who has been honorary surgeon to the Dorset County Hospital since 1895, has resigned that post owing to stress of work; but so intimately has he been connected with the progress of the hospital that it is proposed to mark his services by asking him to retain six beds, together with the rights and privileges of a member of the honorary staff. The opening of an operation room by Sir Frederick Treves in 1903 was a result in large measure of the energy of Mr. Cosens, as also was the provision of children's cots, the installation of X ray apparatus, and the improvement of the hospital in many ways. The committee recently acknowledged with gratitude the sum of £1000 which had been raised by Mr. Cosens for a new electric lift. In the closing years of the last century the average number of operations performed during the year at the hospital was less than 10, whilst now the average is 400.

Reviews and Notices of Books.

TUMOURS OF THE SPINAL CORD.

By CHARLES A. ELSBERG, M.D., Professor of Neurological Surgery, Columbia University. London: H. K. Lewis and Co. 1925. With 354 illustrations. Pp. 421. £2 10s.

THIS is a model monograph. Written by a neurological surgeon of experience, and based on the study of 100 spinal tumour cases personally investigated and treated, it redounds to the credit of all who have contributed to the end-result—a handsomely printed and lavishly illustrated volume conveying information of that practical character which alone can serve. Spinal tumours are not rare; most are amenable to operative interference, and the clinical results not infrequently are brilliant. To attain such desirable results diagnostic acumen of a high class is requisite, for the compression syndrome of the spinal cord follows a variety of pathological processes not all of which lend themselves to successful treatment at the hands of the surgeon. The author describes at some length the diagnostic features of spinal tumours considered generally, and also from the local or regional point of view; distinctions are drawn between intra- and extra-medullary growths, and, finally, differential diagnosis from other conditions of spinal column, membranes, and cord is examined. The reader might suppose from all this that diagnosis has been so simplified as to have reached the stage of "certain," but this is in reality not so. What will impress the student, however, is the evidence furnished by Prof. Elsberg that for accurate diagnosis the radiologist and clinical pathologist have an indispensable contribution to make.

Prof. Elsberg does not appear to utilise the scapulo-humeral and carpo-metacarpal reflexes in cervical cases, though their localising value is considerable; nor does he seemingly refer to the bulbo-cavernosus reflex, of similar usefulness in cauda equina and conus cases. There are but scanty allusions to clinical disturbances in the sexual mechanisms in the latter type of case, and none, as far as we have seen, to modifications in body temperature in cervical tumours. Deviation of the umbilicus is another localising sign, of great significance when it occurs, that does not appear to have been remarked or used. But if some differential minutiæ are ignored the general rules of the diagnostic game are fully coded and illustrated. The pathological and surgical sides of the question are particularly well treated, as is to be expected. We congratulate Prof. Elsberg on his mastery of his subject and on his splendid clinical results.

SURGERY.

Selected Papers. By F. T. PAUL, D.Sc., Ch.M., F.R.C.S., Consulting Surgeon, Liverpool Royal Infirmary. London: Baillière, Tindall and Cox. 1925. Pp. 292. 15s.

THIS is a reprint of a number of contributions to surgery made by Mr. Paul and is published by the surgeons to Liverpool Royal Infirmary to commemorate his seventy-fifth birthday and the fiftieth year of his membership of the Liverpool Medical Institution. Paul's name will ever be associated with the surgery of the large bowel, and it is interesting to read here the position of this branch of surgery just 30 years ago and the problems which confronted surgeons of those days. With great courage Mr. Paul describes how of seven patients in whom colectomy was tried, four died, and how, as a result of this experience, he was led to devise the operation which goes under his name, and which was followed by most happy results. The first use of a glass tube in acute obstruction of the large bowel was described in 1891. The author also did experimental work on gastro-enterostomy and intestinal suture. In 1892 "the operation of gastro-enterostomy was a prolonged process of careful suturing and was extremely fatal. The bone plate method has changed all this." Yet even after this the aperture nearly always closed down in a very short time, and the symptoms of obstructed pylorus returned. Paul devised an experimental method using bone rings, which was more successful. On page 232 he makes an interesting comparison between enlargement of the prostate and involution mastitis, and in another chapter brings forward evidence in support of the view that chronic mastitis leads to carcinoma mammæ. Both these matters still remain undecided and obscure to this day.

It was a happy thought to publish this collection of papers. We have read the book with great pleasure.

Die Chirurgie. Edited by Prof. Dr. M. KIRSCHNER and Prof. Dr. O. NORDMANN. Berlin: Urban and Schwarzenberg. 1925. Vol. III. Pp. 228. M.12.

THIS volume contains accounts of the surgery of the liver and gall-bladder, written by Prof. Heller, of Leipzig, and the surgery of the pancreas, by Prof. Riese, of Berlin. It may be said at once that the high standard set by the two former volumes has been maintained. Both writers treat their subjects systematically and fully. There is a very good account of the anatomy of the gall-ducts with its variations, and, what is very commendable, a section on the physiology and the so-called pathological physiology of the liver. As was to be expected, the section on gall-stones occupies a large number of pages, and in whatever part of the subject the reader is interested, he is sure to find an adequate account. Cholecystectomy from neck to fundus and fundus to neck are both described, and guidance is given as to which method to select, and there are helpful recommendations on when to explore the common duct and when this step can be dispensed with. A warning is issued concerning closure of the abdomen after cholecystectomy. Heller holds that careful selection of cases must be made to avoid trouble after closure without drainage. The account of pancreatic surgery is as good as that of the surgery of the liver, though naturally it possesses a lesser appeal. The book is well printed, and the illustrations are produced with that excellence we are accustomed to find in German publications.

A TEXT-BOOK OF OPERATIVE ORTHOPEDICS.

By A. STEINDLER, M.D., F.A.C.S., Professor of Orthopedic Surgery, State University of Iowa. London and New York: D. Appleton and Company. 1925. With 83 plates. Pp. 403+xv. 30s.

Dr. Steindler tells us in his preface that he considers that the manipulative and conservative treatment still has and should have "a hold upon the majority of orthopedic conditions," and it is obvious that under the term "Operative Orthopedics" he includes only such proceedings as necessitate the use of the knife, excluding subcutaneous methods. He has, we think, successfully carried out what he himself describes as the very difficult task of selecting the methods which are the most valuable. He may have been a little premature in including sympathetic ramisection and a little behind the times in retaining the almost abandoned proceedings recommended originally by Vanghetti for the kinematisation of amputation stumps. A somewhat remarkable omission is that of the operative treatment of fractures by such methods as those of Lane and Hey Groves. Subcutaneous tenotomy is dismissed by the author with only a brief description of the operation on the tendo Achilles, although he says that the method is still extensively used. We demur strongly to his statement that in "the early—pre-antiseptic—era even the subcutaneous tenotomies constituted a formidable operation which was often followed by suppuration and other accidents." It would be interesting to learn on what evidence this statement is made, and what was the nature of the "other accidents." We should have

thought that it is notorious that the Stromeyerian method owed its wide acceptance to the fact that suppuration scarcely ever follows operations performed according to its principles.

This book will be instructive to surgeons who wish for the first time to perform any of the operations described in it, or who may require to refresh their memory as to details. It will also help them to judge of the prospects of improvement or functional cure which the various proceedings offer. There is a chapter on the Principles of After-Treatment which might well have been longer, for in orthopædic surgery it is a commonplace that at the end of the operation the treatment has, in many cases, only just begun. The book is well printed and the reproductions of drawings and photographs are clear, except a few of the latter which might well be replaced by diagrammatic drawings. There is a copious bibliography with an index of authors and an index of subjects. In the former Sir D'Arcy Power appears under the letter D as "D'Arcy Powers" and Mr. Hey Groves under H as "Hay-Groves."

SEX AND BIOLOGY.

The Sexual Life in its Biological Significance. By J. RUTGERS, M.D. Translated by NORMAN HAIRE, Ch.M., M.B. Dresden: R. A. Giesecke. In six parts. 3*s.* each.

THE author of this work, which comprises six parts in all, was an early advocate of birth control in Holland and believes that problems concerning conduct and happiness should be the concern of all and not limited to savants. In this he is in accord with those modern tendencies which would replace sexual ignorance by knowledge. Part 1 treats of the anatomy of the sex organs, but is discursive and unnecessarily complicated; it is not easy to see what benefit is derived by drawing an analogy between the gonads and pathological tumours or inflammatory products, nor to follow the assumption that the substances secreted by a gland are its waste products, and hence the testes and ovaries are not glands. Quite contrary to medical teaching in this country is the statement that vaginal injections are especially important after menstruation, even in young girls. In Part 2, which deals with physiology, the statement is amplified by the warning that if this practice is neglected "everything goes wrong at the first attempts at connexion." In fact, the sound information and advice that the author offers is marred by frequent observations that are not within ordinary experience. In the section on self-control, for example, we read that "if we remain seated too long at a time the abdomen is doubled up, especially if we lean forward; fatal symptoms of congestion and venous stasis may even occur." The context suggests that these results happen in the seminal vesicles. Dr. Rutgers will find wide agreement here regarding the need for sexual enlightenment, but we fear that the result upon the layman of reading this work would not be to bring sexual information into line with other knowledge, but to make of it something further apart. The translation is well done and presents no trace of German idiom.

A MEMOIR OF BUTLER.

Henry Montague Butler, Master of Trinity College, Cambridge, 1886–1918. A Memoir by his Son, J. R. M. BUTLER. London: Longmans, Green and Co. 1925. Pp. 305. 12*s.* 6*d.*

ANY son who sets out to write a memoir of his father must necessarily start at a disadvantage, for it is almost impossible that he should escape bias. Mr. J. R. M. Butler has, however, overcome the difficulty, and though the love and reverence which he felt for his father are obvious throughout the book, yet as a whole the memoir is "true and indifferent." Butler's life is set out mainly from his own letters, sermons, addresses and the like, and from the estimates and opinions of his contemporaries. The account of Butler's career at Harrow (reviewed in THE LANCET, 1920, ii., 1118) was written about five years ago by Mr. Edward Graham, but as an Oxford man Mr. Graham felt that he would be at a disadvantage in writing an account of the Head of a Cambridge College, and the task devolved upon Mr. Butler.

When Henry Montague Butler was called to preside over Harrow School he was only 26. After spending 30 years at Harrow he became Dean of Gloucester, but after 15 months Lord Salisbury offered him the Mastership of Trinity, a post not without justice considered as the highest distinction in the academic world. He accepted, not without many misgivings as to his fitness, for he was beginning his Mastership at a difficult time in the history of the College. A new régime had commenced under the statutes of 1882, only four years before Butler was instituted in December, 1886; he was Master by a Crown nomination and not by that of the Society, many of whom would have preferred a layman, and he followed two such exceptional Masters as Whewell and Thompson. How he overcame all these difficulties, how faithful and honoured a servant he was of the great Society over which he presided, may be found in the records collected by his son. He had one faculty which is a predominant help to anyone who is called to rule: he always tried to see the best side of a man. Apart from his magisterial office he was, says Mr. Butler, "a great humanist; he was not a great savant." Instances of his finished scholarship are scattered through the book, and range from the beautiful "Frater, ave atque vale" (dedicated to the surviving brothers of the son, Gordon Butler, who died at Kantara in 1916) to the delightful odes upon the two dogs, Carlo and Jet, with their Horatian memories, and the amusing English verses written to help novices concerning Greek particles.

THE HARROW SCHOOL REGISTER.

1845–1925. Second Series. Edited by J. H. STAGDON. In two volumes. Vol. I., 1845–1885; Vol. II., 1885–1925. London: Longmans, Green and Co. 15*s.* per vol.

COINCIDENTLY with the biography of the great Harrovian reviewed above there appears a new edition of the Harrow School Register. The last issue, which appeared in 1910, was already unwieldy, and it has been found convenient to divide the book into two volumes. The new edition is naturally swollen by the records of the Great War. They show not only much distinguished service but a toll of over 600 lives. Dr. H. Saunders, Dr. F. Bennett, Dr. D. V. Cow, Dr. W. E. R. Wood, and Dr. A. R. Chavasse are amongst those who have died since the last edition, and in last year alone Harrow lost two of her most distinguished medical sons in John Hammond Morgan, C.V.O., and Sir G. A. Critchett, K.C.V.O. There are rather more than 50 medical practitioners in the Register.

THE HOUSE OF HEALTH.

By Sir JOHN ROBERTSON, C.M.G., O.B.E., M.D., B.Sc. Medical Officer of Health, Birmingham. London: Faber and Gwyer, The Scientific Press. 1925. Pp. 192. 2*s.* 6*d.*

THIS little book represents one of the latest additions to the series of "Modern Health Books," the aim of which is to place the facts of the chief problems of public health within the reach of the citizen of average intelligence. Sir John Robertson has obviously approached his task with pleasure, and has carried it out with skill. He is quite convinced that a house is something more than a mere assembling of bricks and mortar and so he has laid considerable stress on environment. Tracing the types of dwelling from the snow huts of the Laplander and the sampan of the Chinese to the garden suburb houses of the present day, he shows that it is largely education which has

led to the demand for better houses. After discussing the very important question of the site, the atmospheric surroundings, and the water-supply, he goes on to deal with town-planning and the construction of the individual house. He shows as much familiarity with domestic needs and problems as with matters of material and building work, and even the difficult question of finance is cleverly tackled. He deals in some detail with the structural arrangements, internal and external, of a house for an artisan's family of average size, and everything, including cupboards, the bath, the oven, and a place for the pram, receives due consideration. This is a thoroughly fascinating little book, which should be read by all those interested in housing and its problems, and these closely touch most members of the community.

JOURNALS.

THE JOURNAL OF PHYSIOLOGY. Edited by J. N. LANGLEY, Sc.D., L.L.D., F.R.S. Vol. LX., No. 4. September, 1925.—The Coagulation of Blood Plasma when Divested of Corpuscles, by J. W. Pickering and H. G. Reeves. The experiments aimed at determining (1) the rôle in blood coagulation of the formed elements of the blood; (2) the capacity of plasma to clot in the absence of all corpuscles; and (3) the nature of the precipitate obtained by the prolonged cooling of plasma in an ice-chest (i.e., the thrombozyme of Nolf). The authors summarise earlier conclusions and describe their own work on the arterial blood of etherised domestic fowls. They found that pure plasma collected in paraffined tubes and centrifugalised in the cold contained all the material essential for clotting and conclude that blood coagulation can occur without the intervention of either thrombocytes or tissue juices. A slight increase of hydrion concentration tended to catalyse the clotting of bird's plasma, and lowering the surface tension of the plasma increased its tendency to clot, but did not provoke immediate coagulation. The precipitate obtained by cooling pure bird's blood to 0° C had the chemical reactions of the "thrombozyme" of Nolf. It contained phosphorus and accelerated clotting, but did not appear to be an enzyme, since it was not destroyed by heating to 100–120° C. The plasma coagulated after the removal of this precipitate. —Length of Muscle and the Heat and Tension Developed in an Isometric Contraction, by A. V. Hill. Results are described of experiments (1) on the relation between length and heat production, using the double sartorius of the frog and the biceps cruris of the tortoise suspended in a special myothermic chamber; (2) on the relation between length and the ratio of tension developed to heat produced; and (3) on the mechanical efficiency of the muscle regarded as an elastic body. Amongst conclusions on the relation of heat production to length of muscle is that in resting unloaded muscle the same effects are found for all temperatures and for all durations of stimulus. A mechanism is suggested of the Fenn effect (i.e., more energy is liberated by a muscle when it does external work).—Analysis of the Heat Production During a Contraction in which Work is Performed, by W. Hartree. The sartorius of a frog was stimulated for 0·1 second at 0° C., and Fenn's result was confirmed that when a muscle shortens, doing work, and provided that the weight lifted does not bear on the muscle during relaxation, the energy liberated in the form of heat is constant—that is, it is the same as the heat liberated in an isometric contraction, and independent of the load. In such a contraction, therefore, the muscle supplies extra energy equal to the work done. Analysis of the heat production showed that, apart from the liberation of this extra energy as work, there is a considerable increase in the heat liberated during the earlier phases of contraction. This extra heat is compensated by a deficit during relaxation.—On the Mechanism of Insulin, Part I.: The Action of Insulin and of the Salts of Guanidine on the Permeability of the Mammalian Erythrocyte, by J. Secker. Evidence—quantitative, chemical, and microscopic—from experiments on the oxalated blood of sheep, ox, calf, and cat is given in support of the view that the mechanism of insulin is to increase the permeability of the cell membrane. Guanidine increases permeability in the presence of calcium.—The Reduced Sensitivity to Insulin of Rats and Mice Fed on a Carbohydrate-free, Excess-fat Diet, by H. W. Brainbridge. Rats and mice fed on a diet containing protein, salts, and vitamins, from which carbohydrate was omitted, developed a high degree of resistance to insulin. Apparently an increased amount of carbohydrate and complete absence of fat makes the animals still more sensitive to insulin than they would be on a complete diet, but this is not definitely proved. The variations in the sensitivity are not due to deficiencies in vitamin A.—The Combination of CO_2 in the Blood of the Bull Frog (*Rana Catesbiana*), by H. Wastl and A. Seliskar. The blood at 15° C. is less well buffered than that of mammals. The reaction is probably of the same order as in mammals, though it may be slightly more alkaline.—The Spread of Activity in the Tenuissimus Muscle of the Cat and in other Complex Muscles, by E. D. Adrian. The tenuissimus is over 10 cm. long and a few millimeters wide, and is composed of parallel fibres with no intersections and innervated by a twig from the sciatic nerve. The parallel fibres, each about 2 cm. long, are held together by endomysium, and a stimulus to the curarised muscle produces a contraction found to be limited to 1·5 cm. on either side of the stimulated point. Other results of experiments are given.—Effect of the Circulation on the Electrical Resistance of the Skin, by F. Aveling and R. J. S. McDowall. Chloralosed cats were used, as chloralose make sthe vasomotor system of animals appreciably more sensitive than ether. Intravenous injection of adrenalin (1/50 mg.) brought a marked fall in the resistance of the skin of the limbs and the pads of the feet. The fall corresponded with the rise of the blood pressure on injecting the drug, and the return of the skin resistance to its previous height synchronised with the return of the blood pressure. The authors show that in the cat a fall of electrical resistance of the skin is associated with the constriction of vessels and that a rise is associated with a dilatation. —A Method for the Perfusion of the Kidney with De-oxygenated Blood of Known Oxygen Tension, by E. W. H. Cruickshank and D. Orahovats. The method is also applicable to other organs of the body, while the rest of the body is supplied with blood having a normal oxygen content.—The Innervation of Smooth Muscle, Part II.: Frequency of Nerve Impulses Entering and Leaving the Superior Cervical Ganglion, by Harry O. Veach and Jayme R. Pereira. The experiments were made on cats, anæsthetised by urethane and chloroform. The movements of the nictitating membrane were recorded after the pre- and post-ganglionic nerves were isolated. It was found that the frequency of discharge from the cells of the superior cervical sympathetic ganglion of the cat is directly proportional to the frequency of reception from the pre-ganglionic fibres. It is probable that the propagated disturbances in passing through the ganglion are not altered decidedly in frequency. —On Cellular Changes in Intestinal Fat Absorption, by W. Cramer and R. J. Ludford. Experiments described suggest that in the synthesis of fat in the cells of the intestinal epithelium during fat absorption the Golgi apparatus is the cell structure mainly concerned.—A contribution to the journal on the Composition of Alveolar Air at Extreme Heights, by T. Howard Somervell, is referred to in our editorial columns.

NEW NURSES' HOSTEL AT KING'S LYNN.—Some years ago the Queen suggested a number of alterations and improvements at the West Norfolk and Lynn Hospital, and she recently opened the Queen Mary Hostel for Nurses, which practically completes the programme. The hostel, which has cost £8500, contains accommodation for 24 nurses.

THE LANCET.

LONDON: SATURDAY, NOVEMBER 14, 1925.

PRE-CANCEROUS STATES.

THE practical prevention of cancer consists at present in the recognition of the pre-cancerous states to which the Section of Surgery of the Royal Society of Medicine devoted their discussion on Nov. 4th. Of recognisable conditions we can roughly distinguish three categories. In the first place the decennial supplements indicate clearly that some occupations have a much higher mortality than others without there being any obvious local condition to account for the association. Any boy who gave intelligent study to the occupational statistics of the Registrar-General would see that he would have much less chance of dying of cancer if he was a clergyman or an agricultural labourer than if he was a barman or a general industrial labourer; he might or might not act accordingly. In the second place, there are certain chains of events—Prof. BLAIR BELL calls attention to their number (see p. 1003)—which have been identified as often culminating in cancer—smoking clay pipes, being splashed with hot paraffins in the shale-distilling industry, persistent irritation by X rays, and a great variety of other circumstances which all fall under the head of long-continued irritation and among which those associated with the products of burnt coal seem to stand out pre-eminently. And thirdly, we have anatomical abnormalities which are recognised as precursors of frankly malignant tumours, such as melanotic warts, chronic mastitis, and indolent ulcers. How much cancer can be prevented by attention to these occupational, ætiological, and pathological indications—categories which with fuller knowledge will no doubt be merged into one—depends on how far people are prepared to go in taking preventive measures. Removal of the breasts, uterus, and rectum in early life would be extravagant. More people are probably prepared to refrain from the alcohol trade and clay pipes, to be circumcised, and to take various other precautionary measures not more troublesome. But average men and women will not likely do much more than attend to the general cleanliness and hygiene of their skin and alimentary canal, keep clear of modes of life of known danger, and consult a medical man more freely for comparatively trivial symptoms and appearances.

But these pre-cancerous states have an interest and importance for the understanding of cancer as well as for preventive medicine, and in spite of the study which has been given to them there is still much to be found out. The question has been propounded whether a cell becomes malignant because it gets anatomically out of place or whether it gets anatomically out of place because it is malignant. Such a dilemma comes easily to the mind in the contemplation of the distortion of the epithelium at the edge of an old ulcer, where certainly the normal arrangement of epidermis and dermis is not maintained and in which occasionally a virulent epithelioma may arise. It is established that normal epithelium experimentally displaced in a somewhat similar way does not become malignant. But this is not really conclusive that misplacement is secondary rather than primary. Recent studies have brought out emphatically the length of time which may elapse between cause and effect in cancer; men and mice both need to have their skin irritated for about a quarter of their lives before there is much prospect of its becoming cancerous, and even if conditions are so arranged that a single application of hot tar is effective a long time elapses between trauma and tumour. It may well be that experimental displacements fail to imitate the extraordinary deliberation with which the preliminary changes are achieved. The fact that misplacements may be found commonly by the histologists where clinical experience shows cancer to be a rare sequel is also not a final proof that the primary change is in the cell which then by acquired vice inserts itself and its progeny where it ought not to be. Such an argument assumes that we know that a cancer always progresses to an obvious and unmistakable denouement once it has begun. As a matter of fact, there is very little real evidence that this is so. No natural "cause" of cancer is effective in 100 per cent. of cases; most of the causes which have been identified actually produce cancer only in a small minority of all the persons who appear to be exposed about equally thereto. From which it is not unreasonable to suppose that the body possesses means of protecting itself and that it often brings them into play successfully at the very outset of the change.

The question of the cause of cancer has generally been put in the form, "Why do some people have cancer?" The alternative, "Why does not everybody have cancer?" is not quite the same thing, for it suggests a point of view which looks to the resistance of the body as well as to the injury which is inflicted on it. This aspect of the matter deserves more attention than it has had. An obvious tumour might well be the resultant of the normal consequences of a long life and the capacity of the tissues to keep one another in order. The experimentalist, working intensively in a favourable field, can break down the resistance of almost every mouse by tarring it enough; Miss M. SLYE's inbred race of mice cannot resist the trivial traumata of their ordinary lives and nearly all of them die of cancer. Such is a possible way of looking at the facts and it has been followed by those who, in their study of pre-cancerous states, have looked at the connective tissue rather than the epithelium. With the powerful weapon of analysis furnished by Dr. W. E. GYE it should not be long before such speculations can be replaced by conclusions.

A GREAT PHYSIOLOGIST.

THE roots of medicine that reach down into the rather barren strata of the past give support to the tree; but the sap comes from the small rootlets which have recently been put out into unexplored soil. The new arborescence of medical science is a direct result of fresh root expansion, in which physiology is a vital trunk. The work of those "growing points" who first branched off into new ground has given rise to such a mass of offshoots that it is difficult to believe that so many dichotomies have occurred in one or two lifetimes. The tentative rootlet of yesterday becomes a trunk to-day; on ceasing active work it passes into the supporting rather than the nutritive structure of the tree.

The career of the late Prof. J. N. LANGLEY illustrates the importance of a single life in so recent a science as physiology. The beginning of the modern biological school at Cambridge was, practically speaking, the appointment of MICHAEL FOSTER in 1871 as prælector of physiology at Trinity College. LANGLEY was one of FOSTER'S first pupils, was inspired by him to take up scientific work, and in 1903 succeeded him in the University chair of physiology.[1] His most important contributions to knowledge were concerned with the movements of granules in the cells of secreting glands, the detailed elucidation of the architecture and function of the autonomic system, the theoretical significance of the action of adrenalin, and the physiology of nerve endings. His work on the salivary glands, stomach, and pancreas has so completely established itself that even in the most recent editions of the current elementary text-books the migration of zymogen granules towards the lumen of the alveoli is illustrated by the figures which LANGLEY drew nearly half a century ago. The study of these granules brought him by a natural transition to the study of the nerves responsible for glandular activity. His mind, intensely critical of scientific generalisations, resented the then current theory of the action of antagonistic nerves. He held the view that, diverse as were the apparent actions of the chorda tympani and the sympathetic on the salivary glands, there was but one form of secretory nerve, the alleged antagonism being in his opinion due to the stimulation of vasomotor nerves simultaneously with those of secretion. This work on the sympathetic and the chorda tympani, and especially on the action of drugs on them, opened up the whole question of the minute anatomy of the sympathetic system, just as the study of antagonist nerves in the heart had brought GASKELL into the same field. At this distance of time it is not very easy to distinguish the precise contribution of each. Perhaps it may be said that GASKELL laid down the broad lines of function, and LANGLEY laid down the broad lines of structure. The rami, grey and white; the number of fibres in each; where they originated and ended; what were their detailed functions—all these were matters of the most scrupulous research in the hands of LANGLEY and his pupils. They were worked at chiefly by the nicotine and degeneration methods.

LANGLEY'S work on the autonomic system was probably his greatest contribution. Had it not been done by him, it may even be doubted whether it would yet have been done at all—at any rate, so well. His later researches were less individual in conception. Other minds reasoned as truly about receptive substances; other hands might have demonstrated the detailed action of adrenalin; but in the minute geography of each fibre of the sympathetic system LANGLEY'S school was supreme. His genius for technique was exactly suited to the problem. The *Journal of Physiology* (a recent issue of which is reviewed in another column) is a lasting monument to the literary side of his work. For more than 25 years he was in practice its editor, and never was a periodical edited with more personal care. Whole articles, even those whose subject matter could have interested him little, were re-cast and sometimes almost re-written; and though this may have been irksome to the authors it produced a journal unsurpassed in quality in the literature of physiology. But LANGLEY'S work is not to be judged alone by its tangible expression. To his pupils its highest embodiment is the ideal of accuracy which he handed on to them—accuracy in expression, technique, criticism, and generalisation. They would agree in believing that the greatest tribute they can pay to their teacher is to hand on that high ideal of accuracy to a future generation of physiologists.

[1] An illustrated account of the Department of Physiology at Cambridge University by Prof. Langley himself appears as the first article in "Methods and Problems of Education" (Third Series), just issued by the Rockefeller Foundation (61, Broadway, New York).

Annotations.

"Ne quid nimis."

THE TOLL OF CHRONIC NASAL FOCAL SEPSIS.

IN his Semon Lecture at the University of London on Nov. 5th Dr. Patrick Watson-Williams spoke of the necessity of the specialist "thinking imperially" of the influence of local diseases in other domains, —of remembering "overseas" sub-infections. The influence of sepsis in the mouth, teeth, and tonsils is, he considers, already appreciated, and is even allowed to obscure the factor of sinus sepsis, although there is little doubt that septic tonsils and adenoids are often only sub-infections from primary foci in a nasal sinus. There are two ways in which such a focus can affect the remainder of the body. The infective organisms may be inhaled or swallowed, or the toxins (sometimes even the organisms themselves) may be absorbed into lymphatic or blood circulation. Before passing on to the second group Dr. Watson-Williams mentioned the frequency of sinusitis in children. It is still necessary to determine how great a percentage of cases of so-called pulmonary tuberculosis in which no tubercle bacilli are found are in reality due to sub-infective pulmonary sepsis. The wasting of chronic sinus sepsis with bronchial sub-infection, nocturnal rise of temperature, night sweats, expectoration, and febrile reaction to exercise, affords a clinical picture hardly distinguishable from true pulmonary tuberculosis and often enhanced by a chronic septic laryngitis. Dr. Watson-Williams regards the extraordinarily high percentage of patients with chronic sinus infections who have undergone appendicectomy or have suffered from gastric or duodenal ulcer as most striking and suggestive, and lays great stress on the rôle of the carrier without obvious signs or symptoms, whose constant throat or nose infection is a menace to those around him. In his lecture he quoted instances of families in which a parent had such an infection, and he attributed the subsequent nasal troubles and large amount of appendicitis amongst the children to this cause. Migraine, supra-orbital and occipital headache are frequently due to nasal sinusitis, and intense neuralgic pain of the fifth nerve, of the tic-douloureux

type, may be due to a toxæmic neuritis from para-nasal sepsis. The effects of sinus infection in orbital conditions, in rheumatism, and in neurasthenia are well known. Dr. Watson-Williams rightly regards sepsis as of great importance in nervous and mental disorder, and remarks that in the young delinquent it is very frequently responsible for the acts attributed to Satan. In the past too much has been laid at the door of obstruction caused by adenoids, whereas nowadays it is realised that the degree of sepsis and not of hypertrophy is chiefly important. The relationship of the lymphatics of the pituitary membrane crossing the cribriform plate to the peri-meningeal lymph spaces may partly explain the affinity between nasal sepsis and mind and character; but whatever the extent to which this affinity is particular rather than general, it is very real, and there have been many very striking cases in which melancholia, neurasthenia, and mania had been cured by nasal treatment. Though it may be difficult at present, and perhaps dangerous, to differentiate between those cases in which crime is determined by infections and those in which it is a result of innate moral obliquity, it is necessary, Dr. Watson-Williams holds, to consider how far sepsis should be ranged with other toxic causes of mental and moral degeneration, such as alcohol, morphia, cocaine, or syphilis; thus it may be possible to prevent many social and legal transgressions. Infection may be difficult to detect, and it is a serious error to gauge its intensity by the local inflammatory reaction and outpouring of pus, whose relative absence may even show increased liability to systemic poisoning. The active and real coöperation of the aural, laryngeal, and dental surgeon and the physician is needed; but the amount of slight mental disturbance with alteration in character and power of concentration found in domestic life, and the graver manifestations to be seen in prisons, hospitals, and asylums, make a great deal of trouble worth while. "We have learnt," says Dr. Watson-Williams, "to recover radium from rubbish. Can we afford to maintain in these human dust-heaps numbers of men, women, and children who, if adequately treated, might become useful and happy workers?"

RESEARCH ON MERCURY DERIVATIVES.

AMONG the routine remedies for leprosy mercury has long been employed. Within the last 30 years its use has been revived and hypodermic injections of various salts have at one time and another been recommended. The introduction of mercurochrome and its value in septicæmia have stimulated renewed interest in mercury as a germicidal agent, and results have now been published[1] of its experimental use in leprosy. A routine dosage of 2·5 mg. per kilo of body-weight was most easily tolerated, a standard 1 per cent. solution of mercurochrome 220 in distilled water being used. In larger doses stomatitis and salivation were produced. The authors consider that the treatment should be given once weekly. Forty-four lepers treated in this manner have now been under observation for at least a year. In 20 of these the disease was of the active advanced type; 16 had moderately advanced lesions; in six there was active leprosy of comparatively short duration; whilst in two the disease showed no signs of activity. The results obtained do not warrant any undue optimism, but it is claimed that a very definite improvement became apparent in some of the secondary lesions; ulcerating areas healed up, while trophic ulcers responded less readily. In a few instances the recurrence of febrile reactions was no longer noted, and after the first injections the majority of patients claimed to experience a distinct improvement in their general health. In leprosy complicated, as is commonly the case, by pulmonary tuberculosis, no improvement in either disease appears to take place. In surgical practice mercurochrome is still on its trial. It has been found by Bristol surgeons to give excellent results in some cases while proving disappointing in others, and the discrepancy suggested Dr. A. T. Todd's combined experimental and clinical investigation which appears on another page of this issue. In general terms he found mercurochrome to be a powerful antiseptic of rapid action, low toxicity, good penetrating power, and little tendency to irritate. It has the further advantage of not precipitating albumen and of being stable in saline solution for long periods if protected from light. Dr. Todd found the antiseptic properties of the drug to be greatly augmented by acidity, its potency near the neutral point being feeble. For this reason he is inclined to doubt the value of mercurochrome in general infections.

A report[2] on the bactericidal action of some other mercury compounds has been published by a number of workers at the Wellcome Research Laboratories and the Wellcome Research Bureau. They considered that valuable information might be obtained by starting with a comparatively simple substance, mercurating it and a suitable selection of its derivatives, and determining the bactericidal action of the resulting mercury compounds. They selected benzaldehyde as a starting-point and have done much useful work along the lines they laid down, using *B. coli* cultures for the experiments. To discover the reactions of the drugs in differing conditions aqueous solutions, serum solutions, and fatty acid derivatives were used. The serum and oil vehicles reduced the bactericidal activity considerably except in the case of the chaulmoogric acid salt of a mercury benzaldehyde derivative where the activity was doubled, owing presumably to the inherent bactericidal properties of the acid.

BASAL METABOLISM AND THE THYROID GLAND.

THE estimation of the basal metabolic rate is a modern clinical method that has rapidly established its value. It provides a mathematical expression of a definite biological phenomenon, the energy requirement of the organism under various conditions. It has greatly helped to elucidate our knowledge of the metabolic processes in disease and is a valuable guide to treatment. In particular it affords the most accurate means of determining the activity of the thyroid and in diseases associated with under- or over-activity of this gland it finds its greatest usefulness. Dr. F. S. Hansman, who is now director of the biochemical department of the Royal Prince Alfred Hospital, Sydney, has recorded in the *Medical Journal of Australia* (August 22nd) the results of examining 190 patients with thyroid disease whilst he was working at St. Thomas's Hospital, London. In a review of the present knowledge of basal metabolism he states that the basal metabolic rate gives a useful idea of the economy of the individual's body as a working machine. The female basal metabolic rate is normally about 7 per cent. lower than that of the male, and experiment has suggested that the female is the more efficient machine. There is general agreement, he says, that the increase during pregnancy represents the sum of the metabolism of mother and child, and that there is no variation in the mother, and the majority of investigators have found no change during menstruation, though it may perhaps occur in some women. The thyrotoxic patient is a most inefficient machine and requires nearly twice as many calories to perform the same amount of work as a normal person, and accordingly large diets and rest are needed in patients with exophthalmic goitre. Dr. Hansman quotes the work of Boothby and others at the Mayo Clinic, who found that on a diet averaging 5245 calories over 17 days there were 699 calories a day unaccounted for, after making the

[1] The Administration of Mercurial Preparations in Leprosy. Preliminary Report I. Mercurochrome Soluble 220. By Oswald E. Denney, Ralph Hopkins, Jerald D. Wooley, and Boyd G. Barentine (in absentia, Harold K. Marshall). Public Health Reports, vol. xl., No. 35, pp. 1795–1806.

[2] Bactericidal Action of Some Organic Compounds of Mercury. By T. H. Henry, T. M. Sharp, and H. C. Brown. Biochemical Journal, vol. xix., No. 3.

most liberal allowances for all energy outputs. The nitrogen metabolism was normal and protein food exerted its ordinary specific dynamic action. The increase in metabolism may reach 100 per cent. above the normal; 15 per cent. to 25 per cent. above normal may be considered mild and above 50 per cent. severe. He considers that the basal metabolic rate will not give a true idea of how ill the patient is, as the nervous phenomena and the degree of thyroid stimulation by no means run parallel. On the other hand, the basal metabolic rate may give the differential diagnosis between hyper- and hypo-thyroidism. H. S. Plummer and W. M. Boothby [1] have shown that administration of iodine removes all the clinical symptoms of exophthalmic goitre, though the metabolic rate remains high. The theory formulated to account for these facts is as follows: Some chemical appears in the body that is capable of over-stimulating the thyroid; the resulting excess of thyroxin leads to increased metabolism which may reach a high figure without causing the patient any symptoms of distress. These cases Plummer calls "compensated hypertrophies." In the next stage compensation fails because the available iodine is insufficient and the thyroxin produced is therefore imperfect and causes nervous symptoms. The administration of iodine to such cases restores them to the compensated group and the symptoms disappear. Adenomata of the thyroid affect the production of thyroxin in different ways. The tumour may itself produce the hormone or may stimulate the gland to increased production. In other cases the adenoma seems to depress the thyroid activity, while in about 35 per cent. it has no effect. The basal metabolic rate may help the surgeon to determine whether, and how extensively, he shall remove the growth. Removal usually brings the metabolic rate back to normal if there has been aberration due to its presence. Too liberal removal of gland substance with the tumour causes hypothyroidism. Regular estimation of the basal metabolic rate after operation would often enable the doctor to give thyroid medication before serious symptoms of hypothyroidism appeared. The diagnosis of hypothyroidism may be almost impossible from symptoms alone, and many cases of indeterminate "unfitness" would be cleared up by a basal metabolic rate investigation, which would also be a valuable guide to dosage. It is also an unbiased proof of the value of treatment. Valuable statistics could be obtained if all the patients in a hospital were to have routine estimations of metabolism and the various lines of treatment were compared. The interaction of thyroid and pituitary make basal metabolic rate estimations of value in hypophyseal conditions. In acromegaly the rate may be increased or decreased, and when it has become subnormal organotherapy may be very useful. In long-standing cases of Fröhlich's syndrome the rate may be much lowered. Clinicians know that large quantities of pituitary are tolerated if they can be combined with thyroid, and the thyroid itself stimulates pituitary function, but a watch must be kept on the metabolism if the thyroid is to be given without danger of harm.

[1] Iowa State Medical Society Journal, 1924.

RESPIRATORY PHYSIOLOGY ON EVEREST.

A CONTRIBUTION by Mr. Howard Somervell to the September number of the *Journal of Physiology* describes the results of alveolar air analysis during the 1924 attempt to climb Mount Everest. Alveolar air was collected in football bladders from several members of the party at three different heights above sea level, and the samples were taken down to the base camps and analysed. The altitudes were 14,300 ft., 16,500 ft., and 23,000 ft., and the most remarkable feature of the results was the low respiratory quotient at 23,000 ft., which was due to the small value of CO_2 in the alveolar air. At a great height breathing is so rapid (almost 50 respirations to the minute) that the CO_2 is washed quickly out of the alveoli. It appears that at 23,000 ft. the $(CO_2 \div O_2)$ percentage is smaller by some 3 per cent. than at 14,000 ft. During actual motion upwards the pulse-rate was 160–180 per minute, and sometimes even more. The pulse was regular in rhythm and of good volume, but all who went above 27,000 ft. were found to have dilated hearts which took from one to three weeks to recover. During climbing the respiration-rate was about 50–55 per minute, and when a height of nearly 28,000 ft. was reached 7–10 complete breaths were needed for every single step forward and upward. Breathing quickly and deeply at a great height is very easy owing to the low density of the air. In 1924 none of the party was affected mentally by the altitude, as in 1922; minds were clear and tempers and resolution fairly good even at 28,000 ft.; but the simplest tasks—cooking a meal, fetching snow for melting, or taking a photograph—were found very irksome. At the highest camp (26,700 ft.) appetite was profoundly affected, and it was with difficulty that meat was eaten at all. Chocolate and biscuit were managed as a duty, and only pemmican soup and coffee were taken with any real relish, for in the high dry air liquids were the first need. The three weeks acclimatisation and the extra height seem not to have altered the colour index of the blood and the blood pressure appeared to be unaffected.

LEFT-HANDEDNESS AND LEFT-EYEDNESS.

IN his "new interpretation" of left-handedness Mr. Parson sets out on an adventure which has attracted so many investigators previously that his book of 180 pages [1] contains 40 pages of bibliography, which is still incomplete. Briefly stated, his theory is that "eyedness" precedes "handedness." The "master eye" of the popular imagination determines which shall be the dominant hand, and as most people are, for some still unknown reason, right-eyed, right-handedness follows, since on account of our physical configuration we can thus aim more naturally and effectively by bringing the object, the hand, and the macula of that eye into line. The argument is attractive, and by means of a simple apparatus called a manuscope the author was able to support it in examining 608 right-eyed children, only 4 of whom proved to be left-handed. The non-agreement with the formula in one of these exceptions he attributes to a defective right eye. It was found, however, in another case, that it was the left eye that was weak. Still, the relationship at the time of examination seems to be established. It was when of 257 left-eyed children only 32 "confessed" to being left-handed, that the investigation became more complicated. This leaves 225 left-eyed dextrals to be accounted for. "Having found," Mr. Parson writes, "that of the hundreds of children examined, virtually all the right-eyed are at the same time right-handed, we are justified in believing that the natively left-eyed, irrespective of their present manual preference, were originally left-handed." But are we really justified? As there were 257 left-eyed children in a total of 877 examined, it follows that, barring accidents, 29·3 per cent. of the whole must be *natively* left-handed. Bardeleben, in 1914, attacking the problem, apparently on Mendelian principles, had come to the conclusion that the number of left-handers who changed to right-handedness was 26 per cent. of all children. This number corresponds closely with the 225 left-eyed dextrals, who were 25·7 per cent. of the total number of children examined, and so far Mr. Parson's argument finds striking support. But can we be sure that no converted left-handers should be numbered among the right-eyed dextrals? The author's attitude towards his four right-eyed sinistrals (who, he says, *claim* to be left-handed) scarcely suggests that converted left-handers amongst the right-eyed would be welcomed, if found, by the investigator. Lacking information on this, however, we can go no further. To return to the 257 left-eyed subjects, we find that Mr. Parson states

[1] Left-handedness: A New Interpretation. By Beaufort Sims Parson. New York: The Macmillan Company.

that only 32 "confessed" to being left-handed. A moderate proportion of the others certainly admitted one or two left-handed activities, but nothing is said as to left-handed tendencies in a majority of the cases. According to Mr. Parson the odd activities referred to "give a hint as to what more detailed investigation of each case might have developed, had time and circumstances permitted." But the validity of his theory depends entirely upon the result of such a detailed investigation. It is suggested that training in infancy and early childhood has altered the habit of using the preferred left hand. There is no doubt that such an influence is almost invariably exercised, but, as we have pointed out, it is possible that of the 608 right-eyed dextral children many would have used the left hand apart from the same parental influence. Is it even certain that a single left-handed activity is an unfailing sign of a thwarted complete sinistrality? The author goes on to say, "the original bias may in some cases be so slight that in infancy a change might take place without the conscious exertion of any special corrective effort on the part of parents." Here two separate problems are involved: The cause for the original bias, and the origin of the elders' disapproval of a bias to the left side. The former may or may not have a physical basis, but the latter undoubtedly introduces a psychological factor. Why is the child of tender age coerced or coaxed, consciously or unconsciously, into the preferential use of the right hand? What enables it to cling tenaciously to one or more left-handed activities, when for all else it becomes right-handed? Is "eyedness" in any way responsible for the survival of any particular form of activity? It is obviously useless to ask the individual why he developed the habit of using the left hand in the first instance. He started too early for him to remember anything about it. The technique of psycho-analysis, however, may throw some light on the question. Mr. Parson's book certainly carries the problem of left-handedness to a higher plane of inquiry than do many of the previous works on the subject.

ADOLPHE SMITH.

THE death of Mr. Adolphe Smith at Fulham on Nov. 9th removes the picturesque figure of an octogenarian who had met life at many points. Of bilingual parentage, Mr. Smith was equally at home on either side of the Channel. He wrote an admirable guide to Hyères as a health resort, he was intimate with the small but influential community at Monaco, he was publicly thanked by the French Government for personal bravery in the streets of Paris at the time of the Commune. His deep interest in the international labour movement took him to every continental centre where standards of work were under discussion, and few can have known more of the actual conditions of life of the people of many countries. It was this background of knowledge and sympathetic outlook which gave special value to Mr. Smith's work as Special Commissioner of THE LANCET for 40 years. These commissions were set in motion to inquire into various defects associated with social machinery, understood in its broadest sense, at a time when no official body existed for the purpose. Mr. Smith's reports included one on the spread of disease by means of laundrying, in which he found that table napkins from St. James's-street Club were being dried in a Peckham garret over the bed of a small-pox patient, and another on the contamination of uniforms at the Army Clothing Depôt. This report led to immediate reform. He reported on cholera centres in Europe at the danger-point of 1892–94, preparing maps and statistics which helped the progress of epidemiology; for at that time, while the State could legally spend money on investigating the few cases of cholera occurring in this country, there was no official provision for making inquiry on the continent. He reported on the sanitation of a number of continental and American cities, and his revealing survey of the Chicago stockyards was used by Mr. Upton Sinclair in his famous book, "The Jungle." Mr. Smith's investigation into the way of life of East-end tailors having resulted in the setting up of a special commission of inquiry by the House of Lords, he visited 150 sweating dens in the provinces, of which the final outcome was five large blue-books and the initiation of many changes for the better. Articles on the free feeding of school children which he wrote for us were used as evidence in the House of Commons debates which ended in a measure for provision of meals.

In all these ways Adolphe Smith's work was of lasting value to the community, but outstanding for medicine were his reports on the conditions of contract practice 30 years ago. A general movement against the medical man being dragged into contract practice as if it was a profit-making business came to a head at Cork, where the local profession formed a benefit club to be managed entirely by themselves. Mr. Smith went to Cork and set out in a brief letter to THE LANCET the stages of the dispute between medical men and the clubs, the importation of outside medical help, the way in which first the hospitals and then the druggists were drawn into the battle against the demand that bankers, large tradesmen, and well-salaried clerks should be admitted to the medical clubs upon the same terms as poorer clerks, artisans, and labourers, with a miserable yearly fee to cover attendance upon every member of the subscriber's family. From Cork Mr. Smith went on to Portsmouth, where he examined the dockyard benefit societies which admitted infants and juveniles as well as adults at the uniform rate of ½*d.* per head per week; from there, to the medical aid companies at Eastbourne, and so on, over the rural and mining areas, with a divergence to Brussels and a final visit to France, where he discovered no harm being done to the dignity and interests of the medical profession by sick insurance companies. In one of these letters he summed up the position of the club medical officer as the wage-slave of a commercial concern, no longer the guardian of public health, but the promoter of a private business. These articles were issued later as a pamphlet entitled "The Battle of the Clubs," which was widely quoted when the proposals for a National Health Insurance Act first came before Parliament. It is remarkable now to recall with what approval Mr. Smith carried out his difficult task. In person he retained throughout life a certain disarming simplicity of demeanour, and his writing gave the impression of one who observed with candour and who set out his observations without prejudice. Among the host of nameless contributors to our columns none can have had wider influence on broad social conditions than Adolphe Smith.

THE PAINTER AND HIS OCCUPATIONAL RISKS.

ATTENTION has often been directed to the occupation of painting mainly on account of risk of lead poisoning. In this and in other countries committees of inquiry have deliberated and reported. Then came the adoption at Geneva of a recommendation that lead paints should be prohibited internationally for use inside houses. Action to give force to this recommendation has not yet been followed in the different countries concerned. The contention has been advanced that some, at any rate, of the symptoms among painters attributed to lead are, in fact, due to inhaling the fumes of turpentine and other volatile solvents used in paints. There are grounds for accepting that these fumes do cause trouble, but the risk from lead poisoning is hardly thereby minimised. Now further trouble is ascribed to these same solvents by Dr. J. A. Turner, Ohio, U.S.A., whose interest was aroused by the occurrence of skin affections among painters under his care. The trouble consisted in an irritating vesicular eczema on the back of the hands and forearms, which, however, quickly reacted to treatment. He proceeded[1] to

[1] Acute Dermatitis Among Painters, by J. A. Turner, Journal of Industrial Hygiene, 1925, vol. vii., pp. 293–298.

investigate the various paint substances and solvents used—namely: turpentine; naphtha; white paint composed of zinc oxide, white lead and solvents; iron filler, a mixture of carbon black, petroleum and turpentine; thinner, consisting of turpentine and naphtha in equal parts; and sealer, composed of drop black with petroleum. Guinea-pigs were used; the skin over an area was shaved, and the materials were applied for varying periods. He found that all the substances used had a depilatory effect, which, however, was soon recovered from when the application ceased. But he found, in addition, that the paint solvents can cause dermatitis, and that turpentine, thinner, and naphtha are the chief delinquents. Hence he considered that painters should be warned against using paint solvents for removing paint, grease, and oils from their hands, and be encouraged to wash in soap and water, and afterwards to rinse the skin thoroughly with clear warm water.

THE SEVENTIETH BIRTHDAY OF A REVIEW.

A NEWSPAPER, like a country, school, or family, is mainly an abstraction of the mind. Analyse it and you will find nothing more than an office with the founder's portrait, a mortal editor, a material printing-press, a row of bound volumes, and a copy of the current issue. These, it is clear, are none of them the newspaper itself. They are only appendages to an abstract personality expressed by a name—a name which symbolises every thought or action ever associated with itself. Like children, newspapers are easily conceived, born with labour, and casually given names; it is only then that the real struggle begins. They have a very high infantile mortality; they need to be kept warm until their circulation is established; they have to be nursed through the disorders of childhood; they must be educated; and they must find a job. To live to a ripe age is in itself something of a triumph, and to have lived worthily deserves unstinted congratulation. Such thoughts are appropriate to the seventieth birthday of the *Saturday Review*, for its age is an index of the service that has been given to it and through it and inspires faith that in the future it will have as real a place in the community as it has had in the past. In a pleasing article on seventieth birthdays Mr. Gerald Gould tells the immortal story of the Frenchman who fell out of a balloon and was heard to murmur to himself in mid-air: "Pourvu que ça continue!" In an even more optimistic spirit we congratulate our contemporary.

THE next session of the General Council of Medical Education and Registration will commence at 2 P.M. on Tuesday, Nov. 24th, when the President, Sir Donald MacAlister, will take the chair and give an address. The Council will continue to sit from day to day until the termination of their business.

THE Proprietors much regret the delay in delivery of last week's issue of THE LANCET.

DONATIONS AND BEQUESTS.—Nearly £2400 have been raised by a bazaar in aid of the Ashton and Hurst Sick Nursing Association.—Mr. D. C. Edwards, for 50 years clerk to the board of guardians, has given £1000 to the Llanelly Hospital.—Miss Elizabeth Ann Vaughan, of Royston, Herts, besides other bequests, left £1000 to St. Dunstan's Hostel.—Mr. and Mrs. Lye, of Rochdale, have given a donation of £1000 to the Royal Albert Institution, Preston.—A legacy of £20,000 was made to University College, Southampton, by Mr. George Moore, of Lordswood, Southampton, once a member of the College council.—Mr. William Fletcher Rogers, Wallasey, Cheshire, besides other bequests, gave £500 each to the Chester Royal Infirmary, the Wallasey Cottage Hospital, the Victoria Central Hospital, Wallasey, the Star and Garter Hospital for Disabled Soldiers, Richmond, Surrey, and the Wolverhampton Royal Orphanage: and £250 each to Dr. Barnardo's Homes and the Agnes Weston Homes for Sailors, Portsmouth. After other bequests he left the residue of his estate for deserving charities in the City of Chester or the County of Cheshire as his two sisters may decide.

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

CXLVII.—THE TREATMENT OF OBESITY.

THE modern treatment of obesity is based on the subdivision of this condition into two main types, in which the exogenous and endogenous factors respectively play the chief rôle. In the exogenous, the ordinary form, there is an excess of food intake over energy expenditure in an otherwise healthy person, while in the endogenous there is a tendency to accumulate fat independently of these causes. There is usually in the latter condition an alteration of function of one or more of the ductless glands. Naturally, cases occur which must be regarded as transitional forms between the two; these types will be considered under a separate heading.

Exogenous Obesity.

Diet and exercise are the two most important points to attend to in the treatment of this form of obesity. It is possible to reduce weight by diet alone, but exercise is of great value in maintaining the tone of the muscles. It also facilitates the loss of weight by increasing the total metabolism.

Diet.—The bulk of the fat of the tissues is derived from carbohydrate, the remainder from fat. It is usual to cut down the fats to a minimum and allow a certain amount of carbohydrate in the form of vegetables. Bulk can thus be obtained in this way and the appetite satisfied. A low fluid intake is not necessary or desirable, except, perhaps, in cases with cardiac complications. Obesity can be reduced safely on a great variety of diets, so long as sufficient protein and carbohydrate are given to prevent loss of body protein. Of a number of schemes advocated from time to time, the dietetic régimes of Banting, Œrtel, Ebstein, and Von Noorden are probably the best known. In these diets the proportion of protein is increased, while the carbohydrates and fats are reduced to various extents; for details reference must be made to the original monographs. A satisfactory diet should contain a considerable amount of protein in the form of lean meat and fish, a moderate amount of carbohydrate in the form of vegetables, and little fat. Of fish, salmon, herrings, and sardines, containing more than 10 per cent. fat, should be avoided. Poultry, with the exception of duck (30 per cent. fat), may be allowed. Vegetables containing more than 10 per cent. carbohydrate should be used sparingly; the chief of these are the following: Potatoes, 16–20 per cent.; green peas, 13; broad beans, 14; broccoli, 10; onions, 10; parsnips, 18; artichokes, 17. Sugar is better cut down to a minimum and breadstuffs limited to one or two slices a day. All forms of bread contain a large proportion of carbohydrate, varying from 45–65 per cent., and the percentage in toast may be as high as 60. It should thus be condemned. Bread is a difficult article of diet to replace; the quantity must, however, be strictly limited or a patent bread made with casein (prepared for diabetics) may be substituted. Fresh fruit may be allowed in moderation. Bananas, cherries, grapes, and greengages contain more than 10 per cent. carbohydrate and should be restricted. As to cooking, the ideal form is grilling; boiling or roasting may also be employed, but frying should be avoided.

It should rarely be necessary to calculate the caloric value of the food intake. It is important that the body-weight should be controlled by weekly measurements. In most cases it is best to arrange the diet so that the weight is reduced gradually by 1 to 2 lb. a week. This prolongs the period of dieting and accustoms the patient to a small amount of food; he is less likely to overeat again.

Exercise.—The second essential in treating this form of obesity is exercise. Muscular exercise increases the metabolism more than any other factor, and the loss of weight is accelerated. Moderate exercise has been found to increase the metabolism three times, severe exercise as much as nine times its normal rate. Obese patients cannot, of course, take severe exercise without throwing an undue strain upon the heart and circulation, but active exercise can generally be arranged on a graduated scale. When the degree of obesity prevents active exercise the chief substitutes employed are massage, active and passive movement, and faradisation. Massage strengthens the muscles and facilitates the taking of active exercise, but its direct effect on metabolism is slight. Faradisation in the form of the Bergonié system has lately been used considerably; by this means the principal muscles are made to contract rhythmically and in regular order against a load. Most cases of exogenous obesity respond to diet and exercise; the use of thyroid extract is seldom necessary or advisable. Recently, attempts have been made—it is claimed with success—to treat certain of these cases by a combination of subcaloric diet and thyroid extract, but it is probable that these patients really belong to the endogenous group. They are chiefly of the type developing after childbirth and associated with menstrual disorders. The administration of thyroid extract is controlled by repeated estimations of the basal metabolic rate, which is maintained at a level of about +10 per cent. The uncontrolled employment of thyroid extract in obesity is to be condemned.

Endogenous Obesity.

In this form of obesity fat is deposited independently of food intake and energy expenditure: diet and exercise are no more than useful adjuvants to treatment by gland extracts. In endogenous obesity there is a defect of metabolism due to deficient function of certain of the ductless glands, notably the thyroid, the pituitary, and the genital glands. When their function is defective, the ability to metabolise food, and particularly carbohydrate, is subnormal. There may also be a type of endogenous obesity due to excessive secretion of insulin, and the frequency with which obese patients develop diabetes suggests that this supply may ultimately become exhausted; but this condition is not yet definitely recognised.

Differentiation between cases of the exogenous and endogenous groups is not always easy. Onset at or about puberty, or in women after childbirth or at the menopause, and associated disturbances of growth, menstruation, and other conditions suggest a ductless gland disturbance. In other patients endogenous obesity is inherited and appears shortly after birth or about the time of the second dentition. Certain metabolic investigations enable a distinction to be made between these two groups. In the endogenous form the basal metabolism and the tolerance for sugar are usually both abnormal. These tests can be made without difficulty at the bedside. The former is chiefly of value in cases of suspected thyroid deficiency, while the latter can be used to unmask a defective mechanism for dealing with sugar in endogenous cases.

Obesity of Thyroid Origin.

Obesity of thyroid origin must be suspected when a rapidly developing obesity occurs with slight symptoms of hypothyroidism, puffiness of the feet, apathy, diminution of memory, and subjective feelings of cold. The basal metabolism is usually subnormal and should be investigated. Thyroid extract acts as a specific and can be employed as a functional test. The tolerance for these extracts is remarkably high. Withdrawal of food, on the other hand, is tolerated badly. Cure by thyroid extract is rapid and complete. A reliable desiccated extract of the gland should be used and given in gradually increasing doses, starting with gr. ½ once a day and working up to a point at which the patient loses 1 to 2 lb. a week. This rate of loss should be maintained, though as the tolerance increases it may be necessary to increase the dose still further. These patients may require as much as gr. 15 of the desiccated extract a day. The dosage can be more accurately regulated by repeated estimations of the basal metabolism, an attempt being made to maintain it at a level of about +10 per cent. Marked acceleration of the pulse or glycosuria indicates the temporary withdrawal of the extract, or diminution of the dose.

Obesity of Pituitary Origin.

The fat distribution is characteristic, being especially marked around the girdles. The degree of obesity may be excessive and is most commonly found in children and adolescents. It is usually accompanied by disturbances of growth and genital function. When the condition is due to a pituitary tumour little can be expected from treatment by gland extracts, but in other cases there appears to be only a disturbance of function. In these patients the basal metabolism is low—probably due to a secondary thyroid factor—and the carbohydrate tolerance abnormal. The literature contains numerous statements that in such cases pituitary extracts are of value when given by the mouth, the obesity being remarkably relieved in some patients. Thyroid extract is usually said to be of value, though the results are not so uniformly satisfactory as in cases of the true thyroid type. From our experience at St. Thomas's Hospital we have come to the conclusion that pituitary extracts, whole gland, anterior lobe, or posterior lobe are not effective in reducing the obesity of these patients when given by the mouth. They have, however, a definite effect on their carbohydrate metabolism, and when given with thyroid extract greatly enhance the effect of the latter. We conclude that the best results can be obtained by treatment with gradually increasing doses of thyroid extract and whole gland pituitary extract, starting with gr. ½ of each and working up to a point at which the patient loses 1 to 2 lb. a week. Some cases may require as much as gr. 15 of each extract a day. More accurate regulation of the dosage can be obtained by repeated estimations of the sugar tolerance. Reliable desiccated preparations should be used.

Obesity of Genital Origin.

The tendency to obesity, observable in both sexes after castration, is generally attributed to the loss of the secretion of the genital glands. That treatment by extracts of these glands has not up to the present proved effective may be due to lack of effective preparations. The same may be said of the treatment of eunuchoid obesity. It is possible that genital grafts may ultimately prove to be the solution of these problems. Some of these patients can undoubtedly be helped by dietetic measures, others by thyroid extract. As their basal metabolism is sometimes low and carbohydrate mechanism usually defective, the latter is probably the best method of treatment at present available.

Transition Forms.

A number of cases of obesity develop at times when the function of the ductless glands is known to be disturbed: for instance, in women after childbirth or at the menopause, or after some infectious illness. They are not usually regarded as cases of endogenous obesity, but due rather to the sedentary habits and overfeeding of convalescence. In other persons, under exactly similar circumstances, obesity does not result, so that presumably there must be some additional factor. The mechanism of these persons for dealing with sugar corresponds to that of the endogenous type, the curves being nearly always abnormal. Again, treatment by diet and exercise is frequently ineffective in reducing their obesity, while good results can be obtained from treatment with thyroid and whole gland pituitary extracts. It would appear advisable to take all these points into consideration when dealing with any individual case of obesity.

H. GARDINER-HILL,
Asst. Medical Unit, St. Thomas's Hospital.

Special Articles.

CANCER STATISTICS.

BY J. E. RUSH, M.D.,
DIRECTOR, DEPARTMENT OF HYGIENE AND PUBLIC HEALTH, UNIVERSITY OF KENTUCKY.

IT must be apparent that vital statistics, their collection and interpretation presupposes a dual type of training. Biometrics (of which vital statistics is a part) is simply mathematics applied to a biological problem. The mathematics involved is far the simpler consideration, for in order to have the deductions of any value whatsoever, the student must have a clear-cut conception of all the underlying biological factors which influence the collection of the data with which he is working. Obviously, one is not entitled to use a precision measure indicating that the result is correct to 1 part in 100, if in the collection of one single factor there is a probable error of 10 per cent.

Mathematics applied to a Biological Problem.

The handling of figures as applied to vital statistics is relatively easy from a mathematical standpoint, while from the medical standpoint it is fraught with extreme difficulty. To add, to multiply, or divide, to figure rates per 100,000 is nothing but simple arithmetic. To know the limitations of differential diagnosis, the difficulties in the interpretation of physical signs and laboratory data, to have made out death certificates where you could not be absolutely sure, even of the primary cause of death, are all necessary experiences before one is at liberty to interpret vital statistics. Here, perhaps more than anywhere else, does the maxim "Figures don't lie," &c., find its best application.

How does this apply to cancer? There is a group of statisticians that contend that the incidence of cancer is actually increasing; others say that the increase is only apparent and not real, that it is due to better diagnosis, to better reporting of the causes of death, &c. It is certainly important for us to know the truth because science is dependent upon truths, and, furthermore, such knowledge may influence our methods of attack on the problem.

In order to arrive at a basis for the comparison above indicated, it is obviously best to select census years which are sufficiently separated to show any changes (if, indeed, such changes exist) so that we are not forced to draw conclusions from slight differences in data, from which deductions of the kind to be made are not warranted, simply because the slight differences shown are not significant in view of the precision of the biological data subjected to analysis. For many reasons it is thought that a recent ten-year period could best serve our purpose, and for this reason the years 1910 and 1920 have been selected. The intervening census years have been examined in order to be sure that the years selected were representative and that no particular factor, not usually operating, was met in the two years cited.

In the interpretation of vital statistics based on mortality rather than morbidity many seem to feel that there is a great element of precision which allows the manipulation of such data in a purely mathematical manner, and that deductions stated with great mathematical accuracy are warranted. Whatever may obtain elsewhere, this certainly is not true in cancer. It is not necessary to point out to the physician that neither tumour nor cachexia nor both occurring in the same individual are pathognomonic of cancer. One or both of these conditions are frequently met in the anæmias, in arterio-sclerosis and the like, and until we have a different attitude on the part of the public toward post-mortem examinations, these great factors will always influence our vital statistics, even our mortality reports. We must, too, be very careful of false correlation. Only recently it has been stated that the cancer curve has paralleled the increased use of machinery; but to prove that these bear a cause and effect relationship to each other is quite another matter.

Analysis of Reported Increase.

From 1910 to 1920 there is a reported rate increase in the incidence of cancer from 76·2 to 83·4 per 100,000, or over 9 per cent. (1) What are the important differences in the U.S. registration area of 1910 and 1920? (2) What factors or appliances have entered the field of medicine to help in making a better diagnosis of cancer? (3) To what extent has the saving of lives in the lower age-groups increased cancer as one of the causes of death in the upper age-groups?

Let us analyse the statistics of these three years before we answer (see table).

The precision of the data is not such as to warrant us in using the number of significant figures shown in the column entitled "Per cent. of total deaths." The mathematics have been extended in order to make more apparent the differences (should any such exist).

The rate per 100,000 has increased from 1910 to 1920. In 1917 and 1918 much comment was provoked by the apparent arresting of the upward trend of the cancer curve and many explanations were advanced to account for it, such as: 1. The educational programme intended to reach the public with the message that early cancer is curable has begun to bear fruit. Subsequent statistics have proved the incorrectness of this theory. 2. Another most interesting theory was that the war-time diet of the country had influenced the cancer-rate. Diet (on the calorie basis) is terribly over-emphasised as a factor in public health problems, and again we must recall that there was really no very great national change in our modes of living (including diet) during the war. While not attempting to answer the question raised by the statistics of 1917 and 1918, we must remember that the flower of the medical profession was abroad or in camps on this side; that, to take their places many graduates who had never before practised medicine and many retired physicians were pressed into service to meet the public needs. I have no doubt that this accounted for the difference in our vital statistics. 3. That the influenza pandemic took its greatest toll in the age-groups in which cancer is not particularly met is, I believe, an established fact. Many have claimed that the decrease of deaths due to

Cancer (including Sarcoma and Hypernephroma).

—	1910.			1915.			1920.		
	Total deaths.	Per cent. of total.	Rate per 100,000.	Total deaths.	Per cent. of total.	Rate per 100,000.	Total deaths.	Per cent. of total.	Rate per 100,000.
Buccal cavity	1,576	3·8	2·9	2,123	3·9	3·2	2,679	3·7	3·1
Stomach and liver. ..	16,475	40·1	30·6	21,221	38·9	31·5	27,489	37·7	31·4
Peritoneum, intestines, and rectum	5,258	12·8	9·8	7,332	13·4	10·9	9,792	13·4	11·2
Female genital organs..	6,147	15·0	11·4	8,120	14·9	12·1	10,797	14·8	12·3
Breast	3,730	9·1	6·9	5,163	9·5	7·7	6,665	9·1	7·6
Skin	1,459	3·6	2·7	1,955	3·6	2·9	2,367	3·2	2·7
Not specified	6,394	15·6	11·9	8,670	15·9	12·9	13,142	18·0	15·0
Total	41,039	100·00	76·2	54,584	100·00	81·2	72,931	100·0	85·4

'owered infant mortality, the reduction in typhoid fever, tuberculosis, and the like gives an increased incidence in those diseases of the upper age-groups, of which cancer is one. When we recall that effective work of this kind has only been in operation for 10 or 15 years, it is difficult to imagine that the child hygiene and typhoid fever (a disease usually of adolescence) prevention programmes would have yet brought great numbers of individuals into the age-groups where cancer takes it greatest toll.

Perhaps there is some reason to consider tuberculosis alone—this disease has caused (and is causing) so great a mortality—too, we must recall here that the effective work in preventing tuberculosis has apparently decreased the mortality from this dread disease nearly 50 per cent. This is a factor worthy of some consideration, but it may be stated here that the average (and it is very dangerous to deal with averages) age of death as computed from the 1920 mortality statistics is about 35 for tuberculosis, while the same for cancer is over 55 years.

Let us examine the tables above given for cancer mortality in the years 1910, 1915, and 1920. We note that there has been a great increase in the total deaths from cancer and also in the deaths from cancer in the various locations of the body. Undoubtedly most, if not all, of this increase is due to the addition of Minnesota, Montana, and Utah (1910), Kentucky and Missouri (1911), Virginia (1913), Kansas (1914), North Carolina and South Carolina (1916), Tennessee (1917), Illinois, Louisiana, and Oregon (1918), Delaware, Florida, and Wisconsin (1919), and Nebraska (1920), to the registration area of the U.S. as it existed in 1910. The group recorded as "not specified" amounts to from 15 to 18 per cent., unfortunately. This must be interpreted as representing a probable error in the statistics of cancer as reported by location of nearly this magnitude.

There is no one who would claim that our ability to diagnose cancer of the buccal cavity, breast, or skin (which caused the death of the patient) was much better in 1920 than in 1910, but it might be thought that the development of the X ray (particularly if it had been more widely used) might have shown an increased incidence in cancer of the stomach, peritoneum, intestines, &c. No such increase is apparent from an examination of the distribution of cancer in various anatomical locations in 1910, 1915, and 1920. Besides the increase in the total deaths from cancer in the various years shown, there is also quite a definite increase in the rate per 100,000. However, quite a percentage of this increase is found under the head of "not specified," which is, without question, the least reliable of any of the figures above given.

Conclusions.

Some of the statements made above are further strengthened by a report entitled "Mortality from Cancer," &c., prepared in 1914 by the U.S. Bureau of Census, which is a special study of the incidence of the disease. This is the most careful statistical study of cancer in the U.S. which has ever been made. The following facts are gleaned from the report cited. About 2000 death certificates from an estimated 50,000 deaths from cancer were examined, and it was found that in only 2 per cent. of the cases was the diagnosis confirmed by autopsy and in only another 9 per cent. had an operation confirmed the clinical diagnosis.

On the basis of the returns for 1913 it was assumed that about 8500 deaths would be reported as due to cancer of buccal cavity, skin, and breast, "all so situated that no mistake would be probable in diagnosis, and that these, therefore, could be classified as of reasonably certain malignancy." This would mean that in 14,000 cases the diagnosis was "reasonably certain," leaving 36,000 cases in which it was proposed to write to physicians for additional information. About 35,000 letters were sent to physicians and replies received in about 80 per cent. of the cases, with the result that the Bureau was able to compile 30,555 deaths, or 58·3 per cent. of the total appeared under the caption of "Diagnosis reasonably certain," 27·5 per cent. under "Diagnosis uncertain," and 14·2 per cent. under "Diagnosis unknown." With this lack of accurate and definite information in the best cancer study that has ever been undertaken in the United States, are we justified in assuming that a recorded increased change in the death-rate from 76·2 per 100,000 in 1910 to 83·4 in 1920 is indicative of an increased incidence in cancer? With a definite admitted lack of precision of 14·2 per cent. and a possible error of 41·7 per cent. in the collection of the statistics, are we justified in attaching any importance to a change in the end-result of the magnitude of less than 10 per cent.?

Obviously we have not statistics of sufficient accuracy at hand to be certain that cancer is increasing, and the burden of the proof that it is must rest with those who claim that such is the case.

MATERNAL MORTALITY.

A CONFERENCE arranged by the Post-Certificate School was held at the house of the Royal Society of Arts on Nov. 9th to discuss

How the Midwife can Help to Reduce Maternal and Infantile Mortality.

Dr. J. S. Fairbairn, who opened the discussion, emphasised the importance of making the services of the doctor and of the midwife complementary and not rival. In his opinion the normal labour should be conducted throughout by the midwife; the practitioner should supervise the pregnancy, give antenatal care and instruction, and be ready to deal with any abnormality beyond the scope of the midwife's training. The Scottish Board of Health had remarked in a recent report that the doctor was too expensive and highly trained an instrument to use for normal labour. If this was to become the rule it was most important to get the best possible people into the midwifery service. There were not nearly enough fully trained nurses practising midwifery, and it was essential in the interests of public health to devise some means whereby the best class would be attracted. He thought that the practice of midwifery should be made a stepping-stone to public health appointments and the conditions of the midwife made less burdensome. This was the day of team work, and team work between midwives and general practitioners would add greatly to the public health services of both.

Miss Doubleday drew attention to two outstanding statistical facts; that since the passing of the Midwives Act there had been practically no change either in the maternal mortality-rate or in the infant mortality during the first month after birth. She pointed out that 50 per cent. of the births in this country are attended solely by midwives. The reduction of these mortality figures was largely a problem of housing, and she questioned whether the provision of more hospital accommodation were the best solution for normal cases. The routine of the well-equipped hospital did not help the woman when she returned to her own conditions. The midwife in attendance at the home could educate her and show her how to make the best use of those conditions. A very important factor in this education was the father, who was entirely neglected under the hospital system. Educational authorities had been inclined in the past to leave the father in the dark and had not attempted to teach him that his help was really needed. The midwife's work was essentially to advise and supervise. She should insist on her patient going to the doctor at the third and eighth months, and see her at regular intervals throughout the pregnancy and test her urine. Prematurity was one of the main factors in the high mortality-rate. Moreover, there were many minor ailments such as constipation, varicose veins, fatigue, lax abdominal walls, &c., on which helpful advice could be given,

and many parturition troubles could be avoided if every mother were protected from over-fatigue in the first stage of labour. In the puerperium the "handy woman" was a potential danger; she had no idea of the elements of asepsis nor of how to treat any difficulty that arose. It was no use to expect a reduction in the maternal or infantile mortality until skilled nursing of the puerperium could be provided. Often the infant was taken off the breast during these early days for want of sensible advice. To sum up, the contribution of the midwife to the problem was: Observation and education during pregnancy, immediate recognition of any abnormality during labour, and skilled nursing during the puerperium.

The Problems in Rural Areas.

Dr. F. E. Fremantle spoke of the problem in rural areas. The days of the uneducated midwife, he said, were now over, yet some of the least educated midwives had got the best results by the exercise of homely common-sense. He warned the audience not to apply town ideas to country districts. Life in a village was simpler in many ways, and it was necessary to consider the community as a whole. There the doctor reigned supreme, and rightly so, deputing as much responsibility as he possibly could. The essentials of public health lay in the individual. The individual woman had it very largely in her own hands to prevent the disasters of her confinements. While the doctor might be the commanding officer in the campaign for the new life, the sergeant-major was undoubtedly the mother. Therefore, the first essential was to educate mothers, and at no time were they so receptive as during and especially just after their first pregnancy. Moreover, the girls should be taught from schooldays what their maternal function meant and the outlines of its hygiene treatment. To make rural midwifery attractive to suitable women the only satisfactory scheme would be to combine the services of district nursing, including tuberculosis nursing and care of the blind, with midwifery, school nursing, and health visiting. There was a definite future to offer to such women provided the public saw to it that the terms of service were adequate. Permanent quarters ought to be maintained for the nurse in the village. It was just as essential for the village to have a nurse as a parson, and as in the past it had been a public duty to endow the living of the parson so in modern times might the home, if not the salary, of the village nurse be endowed.

The Urban Problem.

Sir John Robertson contributed a paper dealing with large centres, which was read by the chairman. He pointed out how different the situation was in towns, where the midwife could get help in a few minutes and could attend lectures and other forms of instruction; where she could earn more in her more compact practice and pick her patients. He doubted, however, whether the position were really better, although undoubtedly easier and more attractive. There was much value in being thrown back on one's own resources. He urged the recognition of strict etiquette between doctors and midwives. The midwives were fighting the question of unqualified practitioners and ought to be supported by law, but unfortunately a great proportion of their work was done by doctors assisted by "handy women." The midwives ought to be able to send their patients into homes where they could attend them; at present a patient sent into a home was lost to the midwife.

Miss Liddiard, matron of the School of Mothercraft, said that the best educated woman was not doing midwifery because the remuneration was not safe. Country dwellers were often difficult to teach; often the midwife was the only person who could give real education. She believed confinement in the home to be the right thing. Labour was a natural process; why should it be made unnatural by taking the woman away from her husband and family? Moreover, the woman confined in hospital returned without having learned how to manage her baby in home conditions.

Miss Rosalind Paget said that the maternal mortality in 1924 was 1·5 per 1000 in rural areas and under properly-trained and supervised midwives. The women died: we did not know why they died, and that was what we had to find out. There should be post-mortem examinations on every fatal puerperal case. Often the post-mortem findings were clear enough, but were quite different from the diagnosis reached before death. The midwife could help by educating public opinion on the importance of autopsies. The examinations should be performed by competent obstetricians, preferably an official for the district. She also urged a uniform system of birth notification with a space to show clearly who it was that actually delivered the child.

Miss Olive Haydon said that the nursing of the puerperium had been neglected in the enthusiasm for ante-natal care. There were still registered midwives who were incapable of taking pulse or temperature. The mortality-rate could be reduced by careful adherence to the rules of the Central Midwives Board. Post-certificate education should be compulsory, and a longer period of training would help to raise the standard of teaching. More preventive measures should be taught.

Dr. Eustace Hill said that coöperation between the doctor and the midwife was difficult to achieve. Until recently only 19 per cent. of the cases in his district were attended by midwives, but the figure was now increased to over 35 per cent. One of the difficulties in the midwives' service was the opposition of the general practitioner. In one mining district where the public health authority had tried to establish a midwife the doctors had said frankly that they would do their best to starve her out. The two chief causes of maternal mortality were ignorance and the indiscriminate use of forceps. The general practitioner must be educated and also the individual patient on the importance of ante-natal care and the hygiene of labour and the puerperium. Another difficulty in the way of the midwife was that the fee for a doctor called in by a midwife was collected partly or wholly from the patient and might total three guineas, whereas for one guinea the doctor could be retained without a midwife. The patient should not be responsible for fees due to a doctor called in by the midwife. The number of a midwife's cases should be limited; midwives who delivered 300 patients in a year obviously did not do their work properly.

Miss Elsie Hall, speaking as a practising midwife in a poor area of London, said that the midwife had a unique opportunity to encourage husbands to come for an educational talk when she was first booked. She urged that boys and girls should be taught physiology in their schooldays.

Dr. Annie McCall urged the importance of post-mortem examinations. The mortality was high in the general practitioner's work, but much lower in hospitals and in the work of midwives. Doctors had often been sent for too early by midwives because midwives were not taught to do their internal examinations properly. This meant early and unnecessary forceps. She urged the necessity of allowing midwives to give sedative drugs to ensure an easy first stage. She had never seen any harm result from the use of chloral.

Dr. Harold Scurfield said that there was much talk about ante-natal work, but as a matter of fact very little was going on in the country at present. Women would not yet go for ante-natal advice, and must be educated by midwives on its necessity. But the doctor to whom they were sent must not be just any doctor, but a skilled obstetrician, and panels of obstetricians should be compiled. In America the experiment had been tried of putting all the midwifery of a district into the hands of the midwives, backed up by obstetricians. The mortality-rate fell at once. In Australia, where more confinements were conducted by midwives than in any other country, there were fewest maternal deaths. Most of the high maternal mortality was due to meddlesome midwifery.

Dr. R. E. McKenzie said that in Woolwich there was very good coöperation between midwives and the

public health authorities. The midwives sent their cases to the ante-natal centres for advice. The trouble about ante-natal work was that there were no fees for it. Midwives had told her that the L.C.C.'s plan of paying the fee of a doctor called in by a midwife had made matters worse, because before that rule the doctor would come and do what was needed for a very small fee, but now the authority fixed a fee and extracted a part of it from the patient, who never knew what she would have to pay.

Sir Francis Champneys agreed that home was the best place for a normal labour. The woman's home ought to be one that she could be confined in, and that was the ideal to work for. To deny sedatives was inhuman. Opium was an excellent drug and appeared to act as a stimulant or as a sedative, according to the needs of the patient.

PARIS.

(FROM OUR OWN CORRESPONDENT.)

Public Health and Political Stability.

THE overthrow of ministries has its bearing on public health achievement. Here in France technical instruction in public health and popular hygiene is unquestionably good, but its general application throughout the country is poor, as is indeed frankly admitted. Ministerial changes may lie at the root of this failure. Any national accomplishment in public health depends upon the insistent promotion of a definite programme. In England and America the public health programme is only slightly affected by political change. In France the centralised governmental organisation has been unable to continue work along any programme on account of frequent reshuffling in the politico-social system. Leadership in the French public health services has been changed six times during the period 1914–1925. The longest time during which any chief has enjoyed office has been one year and a half; one remained but five months. Anyone familiar with the prolonged period necessary for raising the public health standard of a community will appreciate the effect on a really good public health programme of such frequent political change. As things are these programmes have a hard enough time at the hands of interested politicians.

Small-pox in France.

Vague reports of virulent outbreaks of small-pox in this country seem to have made British visitors thoughtful about choosing their autumn tour, and the British Embassy in Paris is said to have inquired in what departments of France tourists may travel freely without risks of infection. In reply it has been stated semi-officially that measures against small-pox are perhaps more effective in France than in any country. Free vaccination is practised in all the hospitals. Vaccination is compulsory in early childhood, among school children, in the army and navy, in hospitals and asylums, and a provision exists for making vaccination and revaccination obligatory in face of epidemic risk. Prompt application of isolation and vaccination has been found to control such recent outbreaks as that of 29 cases occurring at Toulouse, and that of 23 cases in the Hérault département. Four-fifths of the cases occurred in women who had not been revaccinated since childhood, and the mortality was 33 per cent.

The Bergonié Foundation.

The friends of the late Prof. Bergonié are collecting a memorial fund to be used in establishing a laboratory for electrical and radiological research and experiment. If the funds collected suffice, allowances for specially qualified investigators will be provided, in order that studies of this kind may be encouraged. It is also intended to supply modest pensions for workers disabled by work in electricity, or involving radium and X rays. Those desiring to contribute to this fund should communicate with the Fondation Bergonié, 5 rue Saint Philippe du Roule, Paris.

Awards in Medicine by the Académie des Sciences.

Notable awards in the medical and other sciences were made by the Académie des Sciences of the Institut de France, at its meetings of Oct. 26th and Nov. 3rd. Among the more important were the following: 5000 francs to Gaston Ramon, for work on anatoxins, especially the diphtheric anatoxin; 2500 francs each to Eugene Wollmann, for work on proteolysis and the defence ferments of Abderhalden; to Maurice Javillier (biological chemistry), to Léon Bérard and Charles Dunet, of Lyons (thyroid cancer), and to the group consisting of Sergent, Donatien, Parrot, Lestoquard, Plantureux and Rougebief (the bovine piroplasmoses of Algeria). Awards of 2000, 1500, 1000 francs and less were made to Mercier, Savigny, Rosenthal, Métalnikov, and others for their contributions to anatomy, zoology, blood transfusion, intracellular and protozoan activity.

Reduction of Infant Mortality.

Infant feeding centres are increasing in France. Their work includes supervision of artificially fed infants, together with regular examinations and effective utilisation of wet nurses. In 1922 and 1923 the movement was initiated by private agencies operating at six points outside Paris. Results were so satisfactory that the Assistance Publique has instituted centres at Montluçon, Moulins, Nevers, Toucy, and La Châtre; these care for a total of 280 infants. A private centre at Mainville has also been transferred to the Assistance Publique. For the private centres, a mortality of 16·7 per cent. in 1924 was lowered to 12·7 per cent. in 1925. For the official centres at Paris over the same period the diminution was from 12·3 per cent. to 11·3 per cent. A buffet providing sterile milk for infants, recently established in the railway station at Limoges, has proved so useful that similar buffets will be instituted at Nantes, Tours, St. Pierre-des-Corps, Montluçon, Périgueux, Vierzon, and Les Aubrais. These milk buffets are operated by the railway company of the Paris-Orléans region.

The Parents' Association of the Deaf-Mutes Institution in Paris has presented a vigorous protest against its projected removal to some provincial site. The protest will be considered by the Paris Municipal Council.

A new clinic for mental and neurological hygiene, sponsored especially by Profs. Claude and Nobécourt, and mainly devoted to children and adolescents, has just been established in the rue Vaugirard, not far from the Montparnasse railway station. The clinic provides examination, treatment, hospitalisation, and other aid which may be necessary, and will also be utilised for the instruction of medical students.

At a recent meeting of the Academy, Prof. Achard, on the completion of his five years' period as general secretary of the Académie de Médecine, was unanimously re-elected for another term of five years.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

The Council of Physical Therapy.

AT the recent Atlantic City meeting of the American Medical Association the trustees of the Association were empowered to set up a council to investigate and report on the merits of non-medicinal apparatus and contrivances offered for sale to physicians or hospitals. No time was lost, and a council, constituted on the lines of the Council of Pharmacy and Chemistry, has just met at Chicago. This council consists of two physicists, two physiologists, two pathologists, and four clinicians, whose names carry weight both at home and abroad. The council which, as yet, has simply discussed the scope of its work, intends not only to investigate physical apparatus, but to inquire into

methods of massage, manipulation, hydrotherapy, and remedial exercises, and in the first instance a statement will be prepared of the present status of the various physical therapeutic methods now in use. American practitioners are hopeful of obtaining, through the advice of the council, value for their money.

Diphtheria Prevention.

Until recently the prophylactic use of diphtheria toxin-antitoxin has been almost limited to children of school age. These are naturally the most accessible to the health authorities and can be treated economically by routine methods. Parents in the U.S.A. are accustomed to having vaccination enforced at the school age and an additional measure of prevention comes naturally at this time. In New York City, where the largest numbers of school-children have been treated, there has been a definite fall in the mortality from diphtheria, and though it is hard to say how much this fall is directly due to the use of toxin-antitoxin, the authorities claim that the practice has saved the lives of 700 children since 1914. Considering, however, that more than half the deaths from diphtheria occur before school age is reached and that early diagnosis is most difficult in the pre-school years, it has seemed scarcely adequate to protect only the school-children. Where clinics are held regularly for pre-school children an obvious opportunity exists. Baltimore has had such clinics for several years and has lately taken advantage of them to make toxin-antitoxin immunisation available. As the result of publicity, no doubt, it has now been found necessary to open 12 new stations, and the attendance at these has been most gratifying, from 50 to 100 babies being reported as a weekly average from several of the new stations. At Syracuse, N.Y., where the Milbank Foundation is financing a health demonstration, special clinics are being held for the same purpose, and several pamphlets have been published for popular enlightenment. Copies of them can be obtained from the Syracuse Department of Health, 314, East Fayette-street, Syracuse, N.Y.

Increasing Virulence of Small-pox.

For cities in the United States and Canada in 1924 and 1923 the fatality-rates of small-pox were 1·5 per cent. and less than 1 per cent. respectively; but in the first six months of this year the figure has risen to 3·5 per cent. The fatality-rate for States and provinces (including the rural areas) has reached 2·1 per cent., which is three times that for 1923. The highest rate was in Camden, New Jersey, which reports 97 cases with 44 deaths. The statistical bulletin of the Metropolitan Life Insurance Co., in reporting these figures, predicts that "only thoroughgoing vaccination will protect the American and Canadian populations from an epidemic of deadly small-pox which, under present conditions of indifference to vaccination, bids fair to rival the most destructive small-pox epidemics in public history."

A Scheme of Neurological Convalescence.

The Public Health Committee of the New York Academy of Medicine has been considering the care of various types of convalescent patient. The subcommittee concerned with nervous cases point out that very few neurological cases run a clear-cut course ending in cure, and that the line of demarcation between the subacute and chronic is ill-defined. It is therefore impossible to confine any scheme strictly to convalescence and their proposals include all neurological cases save the really acute. The plan they put forward suggests that there should be four types of home. The first is the general convalescent home as it already exists, in which might be received cases such as peripheral neuritis, mild poliomyelitis, and surgical operations on the brain and cord. A variant of this would be a home more especially adapted to the neurological patient where a resident physician and nurses with some special training would deal with a small number of organic neurological cases and a few functional ones, included with a larger number of ordinary medical and surgical patients. The second type of house would be a new organisation specially run for neurological convalescents, such as choreas, early amyotrophies, neuritis and post-encephalitic cases, residual vascular cases, mild endocrinopathies, and early but already treated neurosyphilitics. A minority of general medical cases would be included in the home in order to improve the morale. Emphasis would be laid on recreations, games, and occupational therapy with a minimum of medicine. The third large type is the neurological convalescent farm, to which is attached a staff of specially trained nurses under a resident physician. This would accommodate exclusively functional cases, and emphasis would be laid on practical occupation, household, gardening, and farm work. Separate establishments should be reserved for behaviour children, including post-encephalitics. The fourth type is the hospital for chronic cases, working in conjunction with the convalescent system. The majority of the patients would require only custodial care, but a few would be admitted for medical study and diagnosis in order to improve the atmosphere of the institution. Stress would be laid on medicinal treatment and physiotherapy and recreations should be supplemented by occupation therapy. The only place for the epileptic would be in a special neurological convalescent home or a chronic hospital reserved for this type of case. The report of the subcommittee concludes with the statement that 5900 prospective patients per annum would probably benefit by the coördination in New York of convalescent homes on the lines indicated.

Obituary.

FREDERICK ST. GEORGE MIVART, M.D. LOUVAIN, F.R.C.S. EDIN.

Dr. F. St. George Mivart, formerly medical officer of the Ministry of Health, died suddenly at his London residence on Nov. 5th at the age of 70. A son of Dr. St. George Mivart, F.R.S., who was a zoologist of more than European reputation, he was educated at Beaumont and the Catholic College of Higher Studies, Kensington. He received his medical training at St. Mary's Hospital, London, and at the Royal Infirmary, Edinburgh, qualifying in 1881 as M.R.C.S. Eng. and L.R.C.P. Edin. Three years later he was admitted to the Fellowship of the Royal College of Surgeons of Edinburgh, and after study in Paris, Vienna, and Louvain he gained, in 1889, the M.D. Louvain. After holding in London the successive posts of house surgeon to the Male Lock Hospital and surgeon to the City Dispensary and Western General Dispensary, he was appointed as medical officer to the Local Government Board, and subsequently to the Ministry of Health.

A colleague in the Ministry of Health sends the following appreciation: "Yet another gap has been made in the already small number who remain of the medical inspectors appointed to the Local Government Board in the last decade of the nineteenth century. Mivart joined the staff when he was about 42, and brought to the work a fine and matured intellect, ripened by experience at home and abroad, and among the great men whose colleague he became Mivart soon made his own distinctive impression. He was not a 'specialist,' as was Parsons, on the then somewhat unsettled isolation hospital question or as Power on epidemiology, or as Copeman in scientific research, but no one was more fit to maintain the dignity of the Government Office to which he belonged than Mivart; none knew better than he how to 'admonish' the neglectful official, not by bludgeoning, but in the manner of expert fencer. Mivart ever expressed his accurate observations and thoughtful deductions in careful and felicitous English, and many articles from his pen were printed in the series of reports by medical officers of the Local Government Board on public health subjects. The

matter of several of Mivart's reports was so striking as to be given wide publicity in the lay press. To the end of his life Mivart kept up a practical interest in public health work, for, since his retirement some six years ago, he had been a councillor of the Royal Borough of Kensington and a Poor-law guardian. Quite recently he spoke of revisiting with myself the scene of one of his early labours, in order to find out for himself what progress had been made in impounding as a public water-supply certain plentiful springs to which his attention had been drawn years before. Like many another project this was never fulfilled. After passing more than the Psalmist's span of life, he has gone to his rest while still in harness, leaving children, a grandchild, and a great-grandchild to mourn his loss with his widow."

He married, in 1877, Marie Sofie, daughter of Mr. D. Maurigny, of Nice, France, and to her we express our sympathy.

WILLIAM EDWARD NICHOLLS DUNN, M.B. LOND., M.R.C.S. ENG.

Dr. Nicholls Dunn, who died at Mentone on Oct. 9th after a long illness, was born at Usk, Monmouthshire, in 1871. He was educated at Monmouth Grammar School where he excelled at both cricket and football. He went to St. Bartholomew's Hospital in 1889, took his medical qualification in 1895, and then held resident appointments at the Metropolitan and Queen Charlotte's Lying-in Hospitals, serving also as house physician and resident anæsthetist at St. Bartholomew's. During the South African War he served as civil surgeon to H.M. Hospital Ship *Nubia*, and at the end of the war, owing to indifferent health, he began to winter in Egypt, where he became well known, first as medical officer in Messrs. Thos. Cook and Son's Nile Service and later as resident in Luxor. Here he did good work amongst the visitors and gave much time to the Luxor Hospital for Natives. Shortly after the Great War broke out Dunn volunteered and entered the R.A.M.C., in which he worked devotedly from 1915–19 at Netley Hospital and the Horton Hospital at Epsom. It was this work and the worry and anxiety attached to it, his friends think, that was responsible for the lighting up of the chest trouble which had threatened him for nearly 30 years. He again wintered in Egypt, 1920–22, but was never the same man as before.

"Bill Dunn," writes one of his friends, "was always a favourite with his fellow students and resident officers, but it was in Luxor that I learned to know him well. He was a first-rate practitioner and good anæsthetist. He had his ideals, was a staunch, kind friend, and a very faithful colleague. He was very jealous of the good name of the profession and very plain-spoken about anything he considered unworthy or not altogether straight and upright. In spite of the ill-health which dogged his footsteps, he made a name at Luxor amongst his patients, both British and American. With the natives of Egypt he was a favourite. In whatever sphere he worked he would have made his mark. His numerous friends will much regret his loss."

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED OCT. 31ST, 1925.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 98 (including 14 new cases at Sheffield, 16 at Sutton-in-Ashfield, Notts, and 25 at Blagdon, Durham); scarlet fever, 2588; diphtheria, 1177; enteric fever, 87; pneumonia, 1100; puerperal fever, 44; cerebro-spinal fever, 7; acute poliomyelitis, 13; acute polio-encephalitis, 1; encephalitis lethargica, 52; dysentery, 1; ophthalmia neonatorum, 110. There were no cases of cholera, plague, or typhus notified during the week.

Deaths.—In the aggregate of great towns, including London, there were 5 deaths from enteric fever, 30 from measles, 8 from scarlet fever, 12 from whooping-cough, 31 from diphtheria, and 51 from influenza. In London itself there were 7 deaths from diphtheria, 13 from influenza, and 24 deaths of infants under two years of age from diarrhœa and enteritis.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

C. W. Keates to *Cambrian*.

Surg. Lt. (R.N.V.R.) L. P. Spero has been entered as Surg. Lt. and has been appointed to the R.N. Hospital, Haslar, for course.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. B. A. Craig retires on ret. pay.

Capt. J. E. Measham retires, receiving a gratuity.

R. J. G. Hyde to be temp. Lt.

TERRITORIAL ARMY.

Maj. W. H. Broad, having attained the age limit, is retd. and retains his rank with permission to wear the prescribed uniform.

Capt. F. B. Julian resigns his commn. and retains his rank.

Lt. W. R. S. Watkins to be Capt.

Lt. V. S. Mitcheson (late R.A., T.A.) to be Lt.

General List (Supernumerary): Capt. F. Hauxwell to be Maj.

Capt. F. C. Chandler, R.A.M.C., to be Divisional Adjutant, 51st (Highland) Divisional T.A., vice Capt. T. L. Fraser, R.A.M.C., who vacates that appt.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Lt.-Col. (Bt.-Col.) G. C. E. Simpson, from Active List, to be Lt.-Col. (Bt.-Col.).

TERRITORIAL DECORATION.

The King has conferred the Territorial Decoration upon the undermentioned officers: Lt.-Cols. C. H. S. Redmond and E. B. Bird, and Majs. C. Corfield, W. J. Harrison, and A. F. Lee.

INDIAN MEDICAL SERVICE.

The King has approved the retirement of Lt.-Col. F. S. C. Thompson.

The King has also approved the relinquishment of their temporary commissions by Capts. Nur Ahmed Quraishi and Chuni Lal Khanna.

Maj. J. W. Jones has been appointed Civil Surgeon, Maymyo. Dr. F. Reynolds officiates as Civil Surgeon, Ruby Mines District. Lt.-Col. J. E. Clements has been appointed Inspector-General of Prisons, United Provinces, vice Lt.-Col. J. M. Woolley, retired. Lt.-Col. M. R. C. MacWatters, civil surgeon, Meerut, has been appointed to the civil medical charge of the Saharanpur District, vice Maj. A. Seddon, reverted to military duty. Lt.-Col. Herbert Hallilay, late civil surgeon, Murree, has been appointed to act as Civil Surgeon, Simla (West), vice Lt.-Col. W. W. Jeudwine. Capt. S. N. Hayes has been posted to Dalhousie as Civil Surgeon in relief of Capt. G. E. L. Simons. Lt.-Col. W. J. Powell, Inspector-General of Prisons, Central Provinces, has been appointed Civil Surgeon, Pachmarhi. Col. P. Dee, hon. surg. to the King, the senior I.M.S. colonel on the active list, has retired and has been succeeded by Col. A. Fenton, late civil surgeon at Mandalay. Capt. S. C. Contractor has been appointed to the Jail Department, Madras. Lt.-Col. F. P. Warwick has been reposted as Civil Surgeon, Amraoti, on return from leave. Maj. G. H. Mahony has been appointed Civil Surgeon and Superintendent of the Jail at Saugor. Lt.-Col. C. A. Sprawson has resumed his appointment as Principal of King George's Medical College, Lucknow. Maj. A. Seddon, civil surgeon, Saharanpur, has reverted to military employment.

DEATHS IN THE SERVICES.

Surg.-General Howard James McChleary Todd, C.B., R.N., hon. surgeon to the King, who died suddenly at Gosport, Hants, on Nov. 6th, was born on Sept. 20th, 1855. He was the son of Mr. M. G. Todd, of Hove, and was educated at Dr. Seaver's School at Brighton, and at St. Thomas's Hospital where he was a prizeman. He entered the Naval Medical Service in 1876 and was in medical charge with the Niger Expedition in 1879. For his services during the yellow fever epidemic at Jamaica in 1885–86 he received the thanks of the Admiralty, and in 1891 he was thanked by the Foreign Office for his services as acting Consular surgeon at Mapanda's Kraal. Surg.-General Todd married in 1893 Florence Agnes, daughter of Mr. E. Haynes, of Thimbleby, Yorks, by whom he had one son and two daughters.

LIVERPOOL'S ACID RAIN.—During the last year 615 tons of organic matter—nitrates, bitumen, calcium salts, sulphates, and chlorides—came down with the rain on each square mile of Liverpool's most densely populated districts. The bronze of the Queen Victoria monument at the end of Lord-street has been so acted on by the sulphuric acid in the rain-water that the copper sulphate formed has sunk to a distance of 4 inches in the Portland stone on which the monument stands.

Medical News.

UNIVERSITY OF OXFORD: *Hospital Scholarships.*—Entrance scholarships and exhibitions have recently been awarded to the undermentioned members of the Oxford Medical School at the hospitals named:—Guy's Hospital: O. A. Beadle, New Coll.; L. T. Ride, New Coll. King's College Hospital: C. F. J. Cropper, University; A. W. Cubitt, Wadham; W. G. Rees, Jesus. St. George's Hospital: H. E. Mansell, Pembroke. St. Mary's Hospital: D. H. Brinton, New Coll.; W. Hurst Brown, Queen's. Westminster Hospital: W. R. Greene, Pembroke; A. T. Leslie Spinks, Oriel; M. G. Pearson, Keble; H. G. Wells, Magdalen.

CHELSEA CLINICAL SOCIETY.—A meeting of this Society will be held in the Board Room of St. George's Hospital on Nov. 17th, at 8.30 P.M., when insulin treatment will be discussed by the following speakers, among others: Drs. E. P. Poulton, George Graham, P. J. Cammidge, and F. G. Crookshank.

ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION.—The next quarterly meeting of the Association will take place at 2.30 P.M. on Tuesday, Nov. 17th, at 11, Chandos-street, Cavendish-square, London, W. 1, under the presidency of Sir Frederick Mott. Dr. J. Carswell will open a discussion on Insanity and Crime: Some Suggestions arising out of the Atkin Report.

ROYAL COMMISSION ON NATIONAL HEALTH INSURANCE.—The forty-fourth meeting of the Commission was held at the Home Office, Whitehall, on Nov. 5th and 6th, Lord Lawrence of Kingsgate and later Sir Arthur Worley in the chair. Evidence was given by Sir William Glyn-Jones as to the powers and duties of insurance committees and the limited field of work open to them under the conditions of the insurance scheme as it has now developed. Thereafter the Commission sat in private to review the evidence which has been received since it began its work and to consider the questions arising therefrom.

ROYAL SOCIETY.—Among the honours conferred this year by the Royal Society are a royal medal to Prof. W. H. Perkins, F.R.S., for work on the constitution of the alkaloids; the Davy Medal to Sir James Irvine, F.R.S., for his work on the constitution of the sugars; the Hughes Medal to Mr. F. E. Smith, F.R.S., for his determination of fundamental electrical units and for researches in technical electricity. Prof. A. Einstein, foreign member R.S., has been awarded the Copley Medal for his theory of relativity and his contributions to the quantum theory. The following have been recommended by the President and Council for election to the Council at the anniversary meeting on Nov. 30th:—President: Sir Ernest Rutherford. Treasurer: Sir David Prain. Secretaries: Mr. J. H. Jeans and Dr. H. H. Dale. Foreign Secretary: Sir Richard Glazebrook. Other Members of Council: Prof. J. H. Ashworth, Prof. L. Bairstow, Prof. F. O. Bower, Prof. S. Chapman, Sir Dugald Clerk, Prof. F. G. Donnan, Prof. E. J. Garwood, Prof. J. P. Hill, Prof. J. B. Leathes, Prof. J. C. G. Ledingham, Sir Thomas Lewis, Prof. F. A. Lindemann, Sir Robert Robertson, Sir Charles Sherrington, Dr. G. C. Simpson, and Mr. W. C. D. Whetham.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—On Monday, Nov. 16th, at 5.30 P.M. Sir Henry Gauvain will lecture for the Fellowship of Medicine on Light Treatment of Surgical Tuberculosis in the Lecture Hall of the Medical Society of London, 11, Chandos-street. This lecture is open to all members of the medical profession. The West End Hospital for Nervous Diseases will hold a three weeks' course from Nov. 23rd, dealing with the diagnosis and treatment of nervous diseases. The lecture-demonstrations will be given at 5 P.M. in the Out-patient Department, 73, Welbeck-street, W. 1. From Nov. 23rd to Dec. 12th the Royal Waterloo Hospital will hold a course in medicine, surgery, and gynæcology, covering all departments pertaining to diseases of women and children. For the convenience of the general practitioner whose available time is limited, the London Temperance Hospital has arranged a late afternoon course (4.30 to 6 o'clock) in general medicine, surgery, and the specialties, from Nov. 23rd to Dec. 4th. There will be a special course at the Infants Hospital from Nov. 30th to Dec. 13th. In December there will be the following special courses: Dermatology, Dec. 7th to 19th, at the Blackfriars Skin Hospital, and a similar afternoon course (4.30 to 6.30) at the Hampstead General Hospital from Dec. 7th to 19th. A copy of each syllabus and the Fellowship general course programme will be forwarded on application to the Secretary of the Fellowship of Medicine, 1, Wimpole-street, London, W. 1.

THE death is announced from Habana of Dr. Juan Guiteras, pathologist and hygienist, at the age of 74 years. His study of yellow fever in Cuba is well known.

TUBERCULOSIS SOCIETY.—A meeting of this society will be held at 1, Upper Montague-street, Russell-square, London, on Friday, Nov. 20th, at 8 P.M., when Dr. A. Sandison will read a paper on Swiss Sanatoria from the English Standpoint.

ROYAL STATISTICAL SOCIETY.—The first meeting of the session will be held on Tuesday, Nov. 17th, at 5.15 P.M., at the Royal Society of Arts, John-street, W.C. 2, when Mr. G. Udny Yule, F.R.S., will read his presidential address: "Why do we Sometimes get Nonsense-correlations before Time Series? A Study in Sampling and the Nature of Time Series."

THE Glasgow University Club, London, will dine at the Trocadero Restaurant, Piccadilly, on the evening of Friday, Dec. 4th, when Sir Henry Craik, M.P., will preside. Any Glasgow University men who, though not members of the Club, would like to attend should communicate with the Hon. Secretaries, 1, Harley-place, London, N.W. 1.

TEMPORARY HOME OF THE FOUNDLING HOSPITAL.—The governors of the Foundling Hospital have purchased the Royal St. Anne's Schools at Redhill as a home for the institution pending the acquisition of a new property and the erection upon it of the necessary buildings.

MODEL ABATTOIR SOCIETY.—The fourth annual Benjamin Ward Richardson Memorial Lecture will be delivered on Friday, Nov. 20th, at 5.30 P.M., in the Lecture Hall of the Royal Society of Medicine, 1, Wimpole-street, W. 1, by Dr. William J. Howarth, medical officer of health, City of London, on the Slaughtering of Animals for Human Consumption. The lecturer will deal with methods practised, desirability of centralisation in relation to meat hygiene, and the avoidance of cruelty. Admission is free, without tickets.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.—At the annual meeting of the Royal Faculty held on Nov. 3rd the following officers were elected for the years 1925 and 1926:—President: Mr. R. M. Buchanan; Visitor: Dr. G. H. Edington; Treasurer: Mr. J. H. MacDonald; Hon. Librarian: Dr. E. H. L. Oliphant; and Dr. James A. Adams, Dr. A. Freeland Fergus, Dr. J. M. Munro Kerr, Mr. Thomas Kay, Mr. Archibald Young, Dr. John Henderson, Dr. H. L. G. Leask, Mr. R. Barclay Ness, Dr. W. G. Dun, and Mr. J. Forbes Webster were appointed councillors.

GLASGOW VICTORIA INFIRMARY.—Towards the £100,000 required for the extensions that are being made, £57,000 has been subscribed, but by fewer than 200 persons, and an intensive appeal for the balance is now being made. The extensions include new operating theatres and a new nurses' home. The infirmary, which was founded 35 years ago with 84 beds and cots, now has 260, and treats ten times the number of patients whom it succoured in 1890.

TORBAY HOSPITAL.—Last week the freedom of the borough of Torquay was conferred upon Mrs. Francis Rowcroft in recognition of her gift of £100,000 for the erection of the new Torbay Hospital. She and her sister, Mrs. Wills, have between them given £123,000 for this purpose. These ladies are the grand-daughters of the late Sir Edward Payson Wills, Bart., of the firm of W. D. and H. O. Wills.

OVERCROWDED MENTAL HOSPITALS.—At the last meeting of the Staffordshire Mental Hospitals Board it was reported that the three mental hospitals in the county are all overcrowded. At Burntwood there are 146, at Cheddleton 66, and at Stafford between 30 and 40 patients in excess of the authorised numbers. It was complained that the boards of guardians were sending many mild cases which might well be treated in their own institutions.

THE LATE DR. G. L. PARDINGTON.—George Lucas Pardington, M.D. Durh., M.R.C.P., who died on Nov. 1st, was one of the oldest medical practitioners in Tunbridge Wells. A Gloucestershire man, he studied medicine at St. Bartholomew's Hospital, qualifying in 1878 and taking the M.B. Durh. two years later. In 1903 he was admitted to the Membership of the Royal College of Physicians. After a short stay in London he settled at Tunbridge Wells, where he had an extensive general practice, which as time went on became more of a consultant character; he was for many years on the honorary staff of the Tunbridge Wells General Hospital. Dr. Pardington was specially interested in climatic problems, of which he had made some little study at home and abroad; he was a member of the Council of the Balneological Section of the Royal Society of Medicine. His contributions to the medical press covered a wide field of clinical problems.

PADDINGTON HOSPITALS.—The four hospitals in the borough of Paddington are burdened by debts amounting to about £50,000, and a determined attempt is being made to place them in a more stable position. St. Mary's spends £60,000 a year and its assured income is only one-third of that sum. The Children's Hospital admits nearly 900 patients a year to its wards. The venerable London Lock Hospital, the pioneer in the treatment of venereal disease, is hampered by insufficient income and an increasing debt, and the Paddington Tuberculosis Dispensary, which claims to have been the first of its kind in England, also needs help.

ROYAL MEDICAL BENEVOLENT FUND.—At the last meeting of the committee 71 cases were considered and £658 voted to 54 applicants. The following is a summary of some of the new cases relieved :—

L.R.C.P. Edin., 1888, aged 73. Met with a motor-bicycle accident while acting as assistant to a doctor and broke both legs and his right clavicle. A doctor at the hospital approached the Fund with a view to getting him away to a convalescent home. An emergency grant of £10 was sent to be used for the applicant's benefit; a further £6 was voted.

M.R.C.S. Eng., 1869, aged 80, who practised in Berkshire and retired. Married and has two children. Investments have failed and applicant, wife, and youngest daughter, aged 47, are now living on money received by the sale of household goods. This case has been investigated through the Guild and the report states that they live in a dingy old house which has a mortgage on it for £730. The interest on this and rates amount to £52 per annum. The eldest daughter, aged 51, is a widow and she is maintained by her son, so cannot render any assistance to her father and mother. An emergency grant of £5 was sent and the Committee voted £40 in 12 monthly instalments.

Widow, aged 68, of M.R.C.P.I., 1880, who practised for 20 years in Wales and died in 1898. Applicant is a trained nurse and has supported herself since her husband's death. She has just had an operation for cataract and is asking for assistance as she has no means and is not yet old enough for the Old Age Pension. £5 was sent as an emergency grant, and a further £5 was voted.

L.S.A., 1884, aged 62, who prior to the war was a ship's surgeon. Served during the war, 1914 to 1923, when he was demobilised from the R.A.M.C., Ireland. Since has made a small income by taking locums. In February last was ill and unable to get further employment, and owing to events in Ireland came to the end of his resources. His wife left him in 1922. November, 1924, Officers' Association gave £5 to enable him to take a post and again in September, 1925, a further £5 was given to his sister for his benefit. As the applicant was very ill he was admitted to King's College Hospital, and when better the Fund was approached with a view to getting him away to a convalescent home. The Fund gave £2 12*s.* 6*d.* for this object.

M.D. Brux. and L.R.C.P. Edin., 1897, aged 57. Unable to get locums has applied to the Fund for assistance. During the last 12 months has received £105 from locums and has had, unfortunately, to apply to the guardians to live, who made an allowance for applicant and wife of 30*s.* a week from Sept. 11th. The rent of one room is 12*s.* 6*d.* a week. Our local secretary sends us a satisfactory report. On his recommendation £5 was sent at once.

Widow, aged 56, of L.R.C.P. Lond. who practised in London and died in July. The late doctor gave up his practice during the war and was unable to take it up again. They had resident patients who were looked after and nursed by the applicant. From paying guests £137 was received during the last 12 months. The rent and rates amount to £90 per annum. The applicant is anxious to get rid of the responsibility of the house and will give it up at the end of this year. She is thoroughly domesticated and a good nurse, and hopes to get a post as housekeeper in a private family. Voted £15 in two instalments.

Widow, aged 85, of M.R.C.S. Eng., 1860, who practised in Lincolnshire and London and died in 1894. She is allowed to live with her daughter who is a housekeeper who earns £50 per annum. The applicant has the Old Age Pension and an allowance of £6 from her eldest son. Three other married sons unable to help. The applicant pays 5*s.* a week towards her board. Voted £30 in 12 monthly instalments.

Widow, aged 53, of M.D. Aberd., 1879, and died in August, who practised until incapacitated by paralysis. The three pensions died with him. Applicant now left without means and the only money in the home is paid by two daughters for their board and lodging at the rate of £1 a week each. Rent and rates are £42 per annum. Applicant's late husband was a pensioner of the Fund. Voted £10 in two instalments.

Widow, aged 68, of M.D. Glasg. who practised in Scotland and died in March, 1922. The long illness of the doctor crippled their resources, and since his death the applicant has tried to live on the income made by letting apartments in the summer. This summer she has only made £40. The cottage occupied is her own and she has to pay rates £17 per annum. A report from the Guild local secretary says it is a case deserving of financial help from the Fund. Voted £18 in 12 monthly instalments.

Widow, aged 58, of M.B. Edin. who was a medical superintendent at a hospital and died suddenly in August. A grant is asked to tide over the next few months while all business matters are being settled. Her probable income will contribute £35 towards her board. The applicant has had the house done up in order to let and has now succeeded in letting two rooms which will bring in £42 per annum. Rent and rates amount to £47 per annum. Applicant has no children. Voted £10.

Subscriptions may be sent to the honorary treasurer, Sir Charters Symonds, at 11, Chandos-street, Cavendish-square, W. 1.

THE LATE DR. R. R. JONES.—The death occurred at Bangor on Oct. 26th of Dr. Rees Rowland Jones in his sixty-ninth year. The son of a Cardiganshire farmer, he was educated at Durham University and the London Hospital, and became M.R.C.S. Eng. in 1880. He held house surgeon appointments at Newcastle and Bangor and settled in the latter town where he gained a large practice. He was an honorary medical officer and radiologist to the Carnarvonshire and Anglesey Infirmary and medical officer for the Bangor section of the Bangor and Beaumaris Union. Dr. Jones took a keen interest in local and national affairs and was deputy mayor of Bangor; ill-health prevented his accepting the office of mayor. He was twice married, and leaves nine children.

SOCIETY OF MEMBERS OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.—At the annual meeting to be held at the College next Thursday, Nov. 19th, at 3 P.M., Dr. L. Haden Guest will move :

"That this thirty-seventh annual meeting of Fellows and Members again affirms the desirability of admitting Members to direct representation upon the Council of the College, which, as now constituted, only represents those Members who also hold the Fellowship. It does so in order that the constitution of the Council of the Royal College of Surgeons of England shall be in keeping with modern ideas of true representation, and more in conformity with the present-day requirements of its Members and Fellows.

"Further, that as the Royal College of Surgeons of England is composed of 19,147 persons, of whom no less than 17,361 are Members, the majority engaged in general practice, this annual meeting respectfully requests the Council (now about to apply to H.M. Privy Council for a supplementary Charter) to avail themselves of this special opportunity to insert a provision therein for some representation of Members, as such, upon the Council of the College, and so restore a right they enjoyed prior to the Charter of 1843."

The resolution will be supported by Dr. J. O'Donovan, Mr. M. J. Smyth, F.R.C.S., and Mr. F. Lawson Dodd, L.D.S.

LADY HARDINGE MEDICAL COLLEGE.—The Government of India has decided to raise its grant to the Lady Hardinge Medical College at Delhi from Rs.200,000 to Rs.310,000. It has also made a grant, for the current year only, of Rs.98,000 for equipment, and the stage of acute financial stringency through which the College has passed is thus satisfactorily ended. The increased grant will enable the College authorities to bring the whole of the attached hospital into use for the first time.

ST. BARTHOLOMEW'S HOSPITAL, ROCHESTER.—It has been decided to spend £80,000 in enlarging this hospital. Founded in 1078 and reconstituted in 1858, St. Bartholomew's claims to be the oldest foundation in the country. It is at present a hospital of 105 beds, but a further 50 beds are to be provided. The Dean of Rochester, the Governor, emphasises the pressure caused by the increase in the number of street accidents, and there are now more than 11,000 patients annually.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY, Burlington House, Piccadilly, W.

THURSDAY, NOV. 19TH, 4.30 P.M.—*The following Papers will be Read:* J. W. Pickering and R. J. Gladstone: The Development of Blood Plasma. Part I. The Genesis of Coagulable Material in Embryo Chicks (communicated by Prof. W. D. Halliburton). D. J. Scourfield: On a New Type of Crustacean from the Old Red Sandstone (Rhynie Chert Bed, Aberdeenshire), Lepidocaris Rhyniensis (communicated by Dr. W. T. Calman). J. R. Norman: The Development of the Chondrocranium of the Eel (*Anguilla vulgaris*) with Observations on the Comparative Morphology and Development of the Chondrocranium in Bony Fishes (communicated by Prof. E. W. MacBride). J. Needham and Dorothy Needham: The Hydrogen-Ion Concentration and Oxidation-reduction Potential of the Cell-Interior before and after Fertilisation; a Micro-Injection Study of Marine Eggs (communicated by Sir Frederick Hopkins). R. R. Armstrong: Studies on the Nature of the Immunity Reaction (communicated by Sir Frederick Andrewes) R. J. Ludford: The Cytology of Tar Tumours (communicated by Dr. J. A. Murray). Eric Ponder: The Inhibitory Effect of Blood Serum on Hæmolysis (communicated by Sir E. Sharpey Schafer). L. Brull and F. Eichholz: The Effects of Calcium and Potassium Ions on Urine Secretion as studied in the whole Animal (communicated by Prof. E. H. Starling). L. Brull and F. Eichholz: The Secretion of Inorganic Phosphate by the Kidney (communicated by Prof. E. H. Starling). F. Eichholz, R. Robison, and L. Brull: Hydrolysis of Phosphoric Esters by the Kidney *in vivo* (communicated by Prof. E. H. Starling).

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

Monday, Nov. 16th.

THE DAVID LLOYD ROBERTS LECTURE: at 5.30 P.M. This Lecture will be delivered by Sir Arthur Keith, on Man's Structural Defects.

Tuesday, Nov. 17th.

GENERAL MEETING OF FELLOWS: at 5.30 P.M.

PATHOLOGY: at 8.30 P.M.
Papers:
Mrs. M. M. Barratt: The Susceptibility of Rats and Mice to Diphtheroid Infections.
Miss D. B. Steabben: Further Experiments on the Action of Colloidal Substances.
Dr. C. Dukes: Early Stages in Cancer of the Rectum.

Wednesday, Nov. 18th.

HISTORY OF MEDICINE: In view of the date and time of the Thomas Vicary Lecture, the November Meeting of this Section is cancelled.

Thursday, Nov. 19th.

DERMATOLOGY: at 5 P.M. (Cases at 4 P.M.)
Cases will be shown.

Annual Dinner of the Society.
Hotel Victoria: 7.30 for 8 P.M.

Friday, Nov. 20th.

ELECTRO-THERAPEUTICS: at 8.30 P.M.
Cinematographic Demonstration:
Dr. L. D. Bailey: Recovery of Function after Nerve Anastomosis.
Demonstration of the
De Forrest Talking Films, with reference to their scope and possibilities in Medical Education. Introductory remarks by Dr. C. B. Heald.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.
THURSDAY, Nov. 19th.—8.15 P.M. (at the London School of Hygiene and Tropical Medicine, Endsleigh-gardens, Euston-road), Laboratory Meeting, at which, among others, the following will give demonstrations: Col. A. Alcock, Drs. Andrew Balfour, H. A. Baylis, Major K. K. Chatterji, Drs. Aldo Castellani, J. T. Duncan, Th. Jeekes, Prof. R. T. Leiper, Drs. H. B. Newham, H. H. Scott, Lieut.-Colonel H. Marrian Perry, Drs. N. A. Dyce Sharp, J. Gordon Thomson, and C. M. Wenyon.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.
MONDAY, Nov. 16th.—5.30 P.M. (at the Royal Society of Medicine, 1, Wimpole-street, W.), Sir Arthur Keith: Man's Structural Defects (Lloyd Roberts Lecture).

ROYAL COLLEGE OF SURGEONS OF ENGLAND, Lincoln's Inn Fields, W.C.
WEDNESDAY, Nov. 18th.—5 P.M., Prof. William Wright: The Mediæval Conception of the Anatomy and Physiology of the Central Nervous System (Thomas Vicary Lecture).

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, W.
MONDAY, Nov. 16th, to SATURDAY, Nov. 21st.—Fellowship of Medicine Lecture, Medical Society, 11, Chandos-street, W. Mon., 5.30, Sir Henry Gauvain: Light Treatment of Surgical Tuberculosis.—CHELSEA HOSPITAL FOR WOMEN, Arthur-street, S.W. Post-graduate Course in Gynæcology. Lectures and Demonstrations daily. Operations and Pathology.—LONDON LOCK HOSPITAL, Dean-street, W. Comprehensive Course, Instruction in the Out-patient Department and Lectures.—CITY OF LONDON HOSPITAL FOR DISEASES OF THE HEART AND LUNGS, Victoria Park, E. Special Course in Diseases of the Heart and Lungs. Lectures, Clinical Demonstrations, and Laboratory Demonstrations.—ST. JOHN'S HOSPITAL, Leicester-square, W.C. Daily Demonstrations in the Out-patient Department. Bi-weekly Lectures Tuesday and Thursday at 5.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
THURSDAY, Nov. 19th.—3 P.M., Mr. E. Miles Atkinson: Hearing Tests. 4.30 P.M., Dr. J. Metcalfe: The X Ray Examination of Pelvic Conditions.
Daily: In-patient and Out-patient Clinics in General and Special Departments, Operations, &c.

THE LONDON SCHOOL OF DERMATOLOGY, St. John's Hospital, 49, Leicester-square, W.C.
TUESDAY, Nov. 17th.—5 P.M., Dr. A. Whitfield: Diseases due to Fungi (1).
THURSDAY.—5 P.M., Dr. R. F. Fagan: Pathological Demonstration.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, W.C.
FRIDAY, Nov. 20th.—3 P.M., Mr. Watkyn-Thomas: An Intra-Cranial Case.

QUEEN CHARLOTTE'S MATERNITY HOSPITAL, Marylebone-road, N.W.
THURSDAY, Nov. 19th.—5 P.M., Mr. Trevor B. Davies: Clinical Aspects of Abortion.

CHADWICK PUBLIC LECTURES.
WEDNESDAY, Nov. 18th.—5.15 P.M. (in the Barnes Hall of the Royal Society of Medicine, 1, Wimpole-street), Sir Wilfred Beveridge: Insects in Relation to Public Health.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, Bloomsbury, W.C.
POST-GRADUATE COURSE: OCTOBER–NOVEMBER, 1925.
CLINICAL LECTURES AND DEMONSTRATIONS.
MONDAY, Nov. 16th.—2 P.M., Out-patient Clinic: Dr. Hinds Howell. 3.30 P.M., Papilloedema: Mr. Williamson Noble.
TUESDAY, Nov. 17th.—2 P.M., Out-patient Clinic: Dr. Walshe. 3.30 P.M., Neurosyphilis: Dr. Hinds Howell.
THURSDAY, Nov. 19th.—2 P.M., Out-patient Clinic: Dr. Kinnier Wilson. 3.30 P.M., Method of Investigating the Eighth Nerve: Mr. Just.
FRIDAY, Nov. 20th.—2 P.M., Out-patient Clinic: Dr. Adie. 3.30 P.M., Poliomyelitis: Dr. Collier.
The fee for the Course, including Pathology Lectures, is £5 5s. For those who hold Perpetual Tickets the fee is £3 3s.

COURSE OF LECTURES AND DEMONSTRATIONS ON THE PATHOLOGY OF THE NERVOUS SYSTEM.
Thursday, Nov. 19th.—12 noon, Syphilis of Nervous System: Dr. J. G. Greenfield.

COURSE OF LECTURES AND DEMONSTRATIONS ON THE ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.
Monday, Nov. 16th.—12 noon, The Cerebral Hemispheres: Dr. J. L. Birley.
Dr. H. J. Macbride is giving a COURSE OF EIGHT CLINICAL DEMONSTRATIONS, CHIEFLY ON METHODS OF EXAMINATION OF THE NERVOUS SYSTEM, in the Wards at 10 A.M. on Tuesdays and Fridays. The fee for this Course is £2 2s.
Mr. Armour and Mr. Sargent operate at the Hospital on Tuesday and Friday mornings at 9 A.M., or at such other times as may be announced.
Any part of the Course may be taken separately. Special arrangements will be made for those unable to take the whole Course.
Fees should be paid to the Secretary of the Hospital at the Office on entering for the Course.
J. G. GREENFIELD, Dean of Medical School.

MANCHESTER ROYAL INFIRMARY, POST-GRADUATE COURSE.
TUESDAY, Nov. 17th.—4.15 P.M., Lloyd Roberts Lecture at St. Mary's Hospital. Dr. T. Watts Eden: What We Can Do for the Unborn Child.
FRIDAY.—4.15 P.M., Prof. J. S. B. Stopford: The Sympathetic Nervous System.

ST. MARY'S HOSPITALS, Manchester.
TUESDAY, Nov. 17th (at the Whitworth-street West branch), Dr. T. Watts Eden: What We Can Do for the Unborn Child (Lloyd Roberts Lecture).

ANCOATS HOSPITAL POST-GRADUATE LECTURES.
THURSDAY, Nov. 19th.—4.15 P.M., Mr. H. Platt: The Treatment of Common Fractures, with Practical Demonstrations.

JAMES MACKENZIE INSTITUTE FOR CLINICAL RESEARCH, ST. ANDREWS.
TUESDAY, Nov. 17th.—4 P.M., Prof. Herring: The Use of Insulin.
SATURDAY.—12 noon, Prof. Murray Lyon and Assistants: Demonstration in the Royal Infirmary, Edinburgh.

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.C.
WEDNESDAY, Nov. 18th.—4 P.M., Dr. C. W. Saleeby: The Rôle of Clothing in the Prevention and Arrest of Disease.

Appointments.

ANDERSON, W. W., M.B., Ch.B. Edin., has been appointed Certifying Surgeon under the Factory and Workshop Acts for Whitchurch.
GRAY, J. S. M'LEAN, Assistant Tuberculosis Officer and Assistant Medical Officer of Health for Renfrew.
TIBBLES, S. G., L.R.C.P., L.R.C.S. Edin., L.R.F.P.S. Glasg., Honorary Oculist to the Actors' Association and the Actors' Benevolent Fund.

Vacancies.

For further information refer to the advertisement columns.
Acton Hospital, Gunnersbury-lane, Acton, W.—Res. M.O. £150.
Altrincham General Hospital, Cheshire.—H.S. £125.
Belgrave Hospital for Children, Clapham-road, S.W.—Hon. Radiologist.
Birkenhead Borough Hospital.—Jun. H.S. £100.
Birmingham General Hospital.—Asst. P.
Bournemouth, Royal Victoria and West Hants Hospital.—Hon. S., Hon. Asst. M.O., Hon. Anæsth., Hon. Dermatologist, and Hon. Dent. S.'s.
Brighton, New Hospital for Women and Children.—Hon. Clin. Asst.
Brighton, Royal Alexandra Hospital for Sick Children.—H.S. £100.
Cambridge, Mental Hospital.—Med. Supt. £800.
Cardiff, Welsh National School of Medicine.—Lecturer in Pathology and Bacteriology. £750.
City of London Maternity Hospital, City-road, E.C.—Res. M.O. At rate of £100.
Douglas, Isle of Man, Noble's Hospital.—Res. H.S. £175.
East London Hospital for Children and Dispensary for Women, Shadwell, E.—Asst. P. £50.

Elizabeth Garrett Anderson Hospital, Euston-road.—H.P., Obstet. Asst., and Two H.S.'s. Each at rate of £50. Also Clin. Assts.
Evelina Hospital for Children, Southwark, S.E.—H.S. At rate of £120.
Hospital for Sick Children, Great Ormond-street, W.C.—H.S. and H.P. Each at rate of £50.
Hove Hospital, Sackville-road.—Res. M.O. £175.
Inverness Northern Infirmary.—Jun. Med. Resident. £100.
Iraq Health Department.—Two M.O.'s. Rs.1200.
Lancashire County Council.—County Analyst. £800.
Lancaster, Borough of.—Asst. M.O.H. and Asst. Sch. M.O. £500.
Liverpool and District Heart Hospital.—Hon. P. and Asst. Hon. P.
London Hospital, Mile End, E.—Hon. Dent. Surg.
London Lock Hospital, 91, Dean-street, W.—Clinical Assistantships.
London Royal Free Hospital, School of Medicine for Women, 8, Hunter-street, W.C.—Sen. Second and Third Assts. for Obstetrical and Gynæcological Unit. £350 to £500.
Longton Hospital, Stoke-on-Trent.—H.S. £150.
Maidstone, Kent County Mental Hospital.—Asst. M.O. £300.
Maidstone, Kent County Ophthalmic Hospital.—H.S. £300.
Margate, Royal Sea Bathing Hospital.—H.S. At rate of £200.
Metropolitan Hospital, Kingsland-road, E.—Pathologist.
Miller General Hospital for South-East London, Greenwich-road, S.E.—Res. Cas. O. £150.
Northamptonshire County Council.—M.O.H. and Sch. M.O. £1100.
Norwich, City and County of.—M.O.H. £1100.
Plymouth Royal Eye Infirmary.—Hon. S.
Preston County Borough.—Asst. M.O. for Maternity and Child Welfare. £600.
Prince of Wales's General Hospital, Tottenham, N.—Clin. Assts., Hon. Anæsthetist.
Queen Charlotte's Maternity Hospital, Marylebone-road, N.W.—Asst. Res. M.O. At rate of £80.
Queen's Hospital for Children, Hackney-road, Bethnal Green, E.—H.P. At rate of £100.
Rhondda Urban District Council.—Asst. M.O. £600.
Royal College of Surgeons of England.—Examiners.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Non. Res. Cas. O. £150. Also H.S. and H.P. Each at rate of £100.
St. Bride's, Pembrokeshire, Kensington Hospital.—Asst. Res. M.O. £200.
St. Helen's County Borough.—Asst. M.O.H. £600.
Sheffield, Jessop Hospital for Women.—Asst. H.S. At rate of £100.
Singapore, College of Medicine.—Prof. of Biochemistry and Prof. of Biology. Each $850–$1000.
University of London.—Associate Examiners.
West London Hospital, Hammersmith-road, W.—H.P., H.S., Aural H.S., and Res. Cas. O. Each at rate of £100.
Willesden General Hospital, Harlesden-road, N.W.—Hon. P.

The Chief Inspector of Factories, Home Office, London, S.W., announces vacancies for Certifying Factory Surgeons at Teddington, Middlesex; Rhyl, Flintshire; Croston, Lancs; and Renfrew.

Births, Marriages, and Deaths.

BIRTHS.

BIRKETT.—On Nov. 3rd, at a nursing home, the wife of G. E. Birkett, M.C., M.R.C.S., High-street, Manchester, S.E., of a daughter.

HOLMES.—On Nov. 6th, at Denbigh, N. Wales, the wife of E. A. Holmes, M.R.C.S., of a daughter.

MARRIAGES.

BENSON—FULTON.—On Nov. 5th, at St. Paul's, Knightsbridge, Dr. Eric John Benson to Beryl Helen, youngest daughter of the late Lieut.-Colonel Carre Fulton, the Durham Light Infantry, and of Mrs. Fulton, late of Guernsey.

SHEARD—VARLEY.—Nov. 3rd, 1925, at Brock-street United Methodist Church, Lancaster, Arthur Sheard, M.D., 13, Hanover-square, Leeds, elder son of Mr. and Mrs. Joe Sheard, 36, Sunny Bank, Longwood, Huddersfield, to Alice Gertrude, eldest daughter of Mr. and Mrs. Arthur Varley, 36, Dallas-road, Lancaster.

DEATHS.

CRADDOCK.—On Nov. 4th, at "Somerdale," Greenway-lane, Bath, Samuel Craddock, M.R.C.S., aged 91.

DAVIDSON.—On Oct. 28th, at Charmouth, Dorsetshire, Harold Davidson, M.R.C.S., L.R.C.P., of Teddington, aged 64 years.

LASLETT.—On Nov. 2nd, Maurice Howard Laslett, L.R.C.P., M.R.C.S., late Captain, R.A.M.C., of Duncan-road, Gillingham, Kent.

LAY.—On Nov. 6th, at Peasenhall, Suffolk, Charles Edward Lay, M.D. Edin., L.R.C.P., M.R.C.S.

NEWTON.—On Nov. 9th, at Deene House, Kettering, Lancelot Newton, M.R.C.S., L.S.A., of Alconbury Hill, Huntingdon, aged 79.

ST. GEORGE MIVART.—On Nov. 5th, very suddenly, F. St. George Mivart, M.D., aged 70.

TODD.—On Nov. 6th, suddenly, Surg.-General Howard J. M. Todd, C.B., K.H.S., J.P., of Anglesey House, Alverstoke, aged 70.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

CONTROL OF THE FOOD-SUPPLY.

A SECOND lecture on the Control of the Food-Supply was delivered on Nov. 6th by Dr. W. J. Howarth (medical officer of health for the City of London) at the Royal Sanitary Institute, when several interesting judgments were expressed on contentious points. Dr. Howarth ranged himself on the side of those who believe that raw milk is far better than milk treated in any way by heat; he thought that dairymen who sterilise milk spoil it. All milk which has been pasteurised should be declared as such; the regulations should be varied, and it should be made an offence to treat milk without declaration. At present there is no guarantee that milk which is pasteurised quasi-secretly is not submitted to more than one treatment. Dr. Howarth held that persons had no right to engage in the milk trade unless they had the knowledge necessary to prevent their business being a danger to the public health and unless they possessed the capital necessary for its conduct on hygienic lines. The advertising caption "London's safest milk" contained a cynical suggestion; London's worst milk should make the producing cow blush. The effect of the teaching of the agricultural colleges on clean milk ought to make itself felt on the next generation of farmers.

Dr. Howarth regarded the definition of cream in the Preservatives Order as "that portion of milk rich in milk fat which has been separated by skimming or otherwise" as far too indefinite. Samples of cream containing 20, 30, and 50 per cent. of fat were shown; none of them could be distinguished by the naked eye from another. On the contrary a sample of 33 per cent. homogenised cream had a richer appearance than the 50 per cent. cream, so that the public can easily be deceived and often pay the same price for articles of very different food value. A food standard of cream should be laid down by legislation. Discussing cow-sheds, Dr. Howarth thought the standard in this country deplorably low, and he deplored the position reached about the legal standard of milk; case law had forced us to accept milk from the cow as a legal test of non-sophistication. If a cow gave wretchedly poor milk below the low legal standard it should be eliminated from the herd. When a farmer could send to his customer the first part of the milk drawn, which is notoriously poor in cream, and retain the second portion rich in cream for his own calves, surely we had reached the limit of statutory toleration. Some of the analyst's results which were, in a way, too satisfactory as regards fat content—fat percentages of 4, 5, or 6, or even over, being found—might be explained by the jolting of the milk churns during the long railway journey, which caused the cream to rise to the top of the milk on its arrival; it was found impossible to mix the milk so as to make the contents of the churn uniform. Milk which had been frozen presented a difficulty; the part containing the cream and the fat was the last to freeze; thawing must be gradual and the time given to subsequent mixing generous. The audience were shown two Dutch (hard) cheeses, of which the one made of skimmed milk had the better flavour, though the other was made of full cream milk. The housewife would probably buy the less nutritive. Legislation enabling the consumer to purchase according to food value was required.

The position as regards eggs was explained; no means existed for ascertaining the age of an egg within very wide limits, and legislation was contemplated which would necessitate the stamping of eggs with the name of the country of origin. Dr. Howarth thought it unreasonable to require that parcels of food containing damaged portions should be thrown away, and instanced a consignment of coffee containing unsound berries which after removal of the unsatisfactory portion had been found quite wholesome. In reply to a question he expressed the view that in spite of the results of animal experiments putrefying meat should be condemned partly on æsthetic grounds and partly because of the possible existence of more than one infection.

TELEPHONING RADIOGRAMS.

ON April 15th, 1925, a radiogram showing the bones of the hand was telephoned from New York to Chicago in seven minutes, and it is stated that details were not lost in transmission. We reproduce below a radiogram said to have been telephotographed and the facsimile which was received at the other end, and although there is a very definite loss of clearness, the facsimile is nevertheless remarkably accurate, and compares favourably with some reproductions of sound over the same instrument.

It is said that in sleep it is impossible to feel surprise, and the stream of modern invention is having a slightly hypnotic effect on the public. This particular invention, however, is supposed to be startling in its usefulness and especially to the medical profession. "Medical consultation

between doctors on X ray plates transmitted by radio or telegraph is a realisation that should find a most useful place in these progressive times," says Dr. J. M. Steiner, radiologist to the Roosevelt Hospital, New York. "The quick transmission obtained by this method should afford untold satisfaction to both the consultant dock [sic] and the anxious family. In New York hospitals they frequently have patients who are either injured or taken ill while travelling. These patients, being in strange hands, naturally desire their home physician in consultation. If explicit information could be quickly transmitted to the home physician much needless travel could be avoided, saving the home physician or family a trip to New York. Many times physicians in other cities, desiring an opinion from a New York consultant, could materially shorten a tedious delay if X ray plates were quickly transmitted by telegraph to New York consultants, who in turn could render an opinion within an hour or two where otherwise several days to a week or more might be involved. Written descriptions or word pictures even of such simple conditions as fractures are often misleading, whereas the actual conditions shown graphically in X ray plates are more convincing."

The radiogram transmitted. The facsimile received.

If the reproduction which the specialist is to receive were as good as the original his advice would obviously be valuable, but it is a little difficult to think of a situation in which the specialist could see more in a clouded copy than the practitioner could see in the original radiogram. The practitioner has the additional advantage of seeing the patient himself. The finer shades of structure are diminished in the photograph we have seen, and it is chiefly in the interpretation of these finer shades that the expert scores. Admittedly such a photograph might be better than "written descriptions or word pictures," and it might possibly be useful if a radiologist were present who was not also a doctor; but if the invention is to encourage the local doctor to rely on the opinion of someone who has not seen the case it should stimulate the supporters of the back-to-the-bedside movement to further activity. A story is told of a lady who received a severe fracture of the knee during a recent tornado in the Middle West and had to be taken to New York because the medical men available were not X ray specialists and could not treat her; but if the story induces reflection, it is not necessarily on the value of telephotography.

BRITISH MOSQUITOES AND THEIR BITES.

DURING recent years, and particularly since 1917, when the return of many malarious soldiers from the East gave rise to locally contracted cases of malaria in several parts of England, increased attention has been given to the annoyance and ill-health that may be caused by mosquitoes in this country. The menace of malaria ceased when sufferers from the disease no longer arrived in large numbers from abroad, but interest in the harmful activities of the mosquito in England has not abated. Cases of septicæmia following their bites are occasionally reported, and in some areas the insects are so disturbing as to discourage visitors from returning. To meet the demand for information the British Museum (Natural History) has issued a booklet on "British Mosquitoes and their Control," by F. W. Edwards, of the Department of Entomology, and Lieut.-Colonel S. P. James, M.D., of the Ministry of Health. In reference to the difficulties of control it is stated that there are 26 different species of mosquito which occur in England, and most of them have different habits of life. Some do not bite human beings; some bite mainly in houses, others in the open air; some are troublesome in spring, others in autumn; and there are differences in breeding seasons and habitat. The writers consider that it is important in any locality where anti-mosquito work is begun to make a study of the prevalent species. Measures appropriate against the adult insects and larvæ are described, and a short account of means of protection against bites. The ideal substance for the latter purpose has yet to be found, but the following preparations are suitable for general use: (1) A 50 per cent. alcoholic solution of thymol or of oil of cloves in lanolin. (2) Oil of cassia, 1 part; brown oil of camphor, 2 parts; lanolin, 4 parts. (3) Citronella oil, 1½ parts; kerosene, 1 part; coconut oil, 2 parts; to which is added carbolic acid, 1 per cent. It is useful to wear two pairs of thin stockings or socks since few mosquitoes will bite through two layers of material, however thin. An application of an alkali such as weak ammonia or washing soda will generally reduce the irritating swelling that follows a bite, and thus prevent infective scratching; in serious cases iodine in glycerine should be applied to the bite and the surrounding skin twice a day. This interesting short account of the British mosquitoes can be obtained from the Natural History Museum, Cromwell-road, S.W. 7; the price is only 6*d*.

MANCHESTER NURSES' LONG HOURS.

MANCHESTER had a "Duty Week" from Oct. 25th to 31st, when, according to posters displayed in prominent situations in the city, everyone was invited to be "on duty" in an effort to help the fund for the establishment of a new nurses' home for the Royal Infirmary. At a luncheon on Oct. 22nd Lord Derby and other speakers appealed particularly to the representatives of trades and associations for much-needed assistance. The new building alone will cost £90,000 and will consist of 270 bedrooms, sitting-rooms, and recreation-rooms. Manchester, it was pointed out, was at the moment at the bottom of large cities with regard to the hours its nurses have to work. The night staff works 73 hours a week and the day staff 63 hours. These are the bare facts and it was for them to endeavour to remedy them. For the real efficiency of the nurses more leisure was required, and in order to arrive at this by bringing the working hours down to 58 it was necessary to add 172 nurses and domestic workers to the staff of the Royal Infirmary. The Chairman of the Infirmary Board said many nurses broke down in health every year and 66 per cent. left the hospital before they had finished their first year of training. Already £36,000 had been given towards the scheme and £5000 of that was raised by the nurses themselves.